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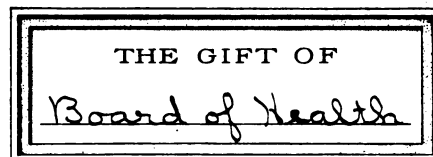
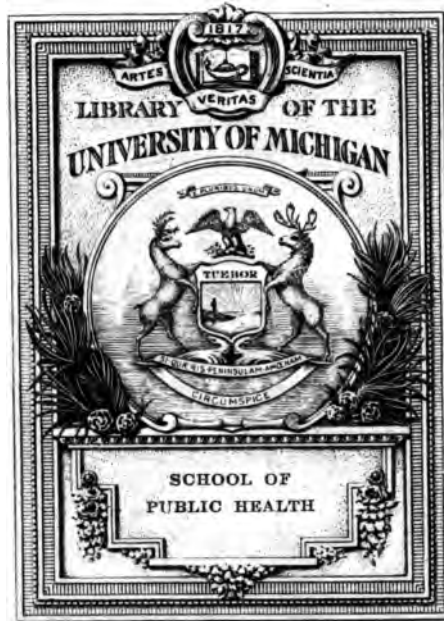
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Public Health

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THIRTIETH ANNUAL REPORT
OF THE
SECRETARY
OF THE
STATE BOARD OF HEALTH
OF THE
STATE OF MICHIGAN
FOR THE
FISCAL YEAR ENDING JUNE 30, 1902.



BY AUTHORITY

LANSING, MICH.
ROBERT SMITH PRINTING CO., STATE PRINTERS AND BINDERS
1903

*Transf. to
Public Health
3-22-44*

OFFICE OF THE
SECRETARY OF THE STATE BOARD OF HEALTH, }
LANSING, MICHIGAN, DECEMBER, 1902.

To HON. A. T. BLISS, *Governor of Michigan:*

SIR—In compliance with the laws of this State, I present to you the accompanying report for the fiscal year ending June 30, 1902.

Very respectfully,

HENRY B. BAKER,
Secretary of the State Board of Health.

143949

CONTENTS.

PART I.

	Page.
Title page.....	i
Letter of transmittal to Governor Bliss.....	iii
Contents	iv
Introduction and general statements.....	vii-ix
Work of the board, fiscal year 1902.....	ix-xli
Regular and special meetings of the board, fiscal year 1902.....	xlii
Annual address of the president.....	xlv-xviii
General work in the office of the secretary, fiscal year 1902.....	xix-xxiv
Report of the secretary relative to property, fiscal year 1902.....	xxiv-xxvi
Amount and classification of expenditures, fiscal year 1902.....	xxvi, xxvii
Summary from quarterly reports of work in the office of the secretary, 1902.....	xxvii-xxx

PART II.

Principal meteorological conditions in Michigan in 1901.....	1-57
Time of greatest prevalence of each disease in Michigan in 1901.....	58-104
Communicable diseases in Michigan in 1901.....	105-109
Consumption in Michigan in 1901.....	110-125
Pneumonia in Michigan in 1901.....	126
Diphtheria in Michigan in 1901.....	127-139
Typhoid fever in Michigan in 1901.....	139-166
Scarlet fever in Michigan in 1901.....	167-179
R5thein (German measles) in Michigan in 1901.....	180
Meningitis in Michigan in 1901.....	180-189
Measles in Michigan in 1901.....	190-205
Whooping-cough in Michigan in 1901.....	205-214
Smallpox (variola) in Michigan in 1901.....	215-228
Chicken-pox (varicella) in Michigan in 1901.....	229
Cowpox in Michigan in 1901.....	229-231
Syphilis in Michigan in 1901.....	231
Erysipelas in Michigan in 1901.....	232
Puerperal fever in Michigan in 1901.....	232
Itch in Michigan in 1901.....	232, 233
Mumps (parotitis) in Michigan in 1901.....	233, 234
Tetanus in Michigan in 1901.....	234, 235
Tuberculosis in animals in Michigan in 1901.....	235
Glanders (farcy) in Michigan in 1901.....	236
Anthrax in Michigan in 1901.....	237
Rabies (hydrophobia) in Michigan in 1901.....	237, 238
Actinomycosis (lump jaw) in Michigan in 1901.....	238, 239
Meat poisoning and diseased meat in Michigan in 1901.....	239
Alleged nuisances in Michigan in 1901.....	240
Casualties from use of kerosene in Michigan in 1901.....	241
Casualties from use of gasoline in Michigan in 1901.....	242

REPORT.

PART I.

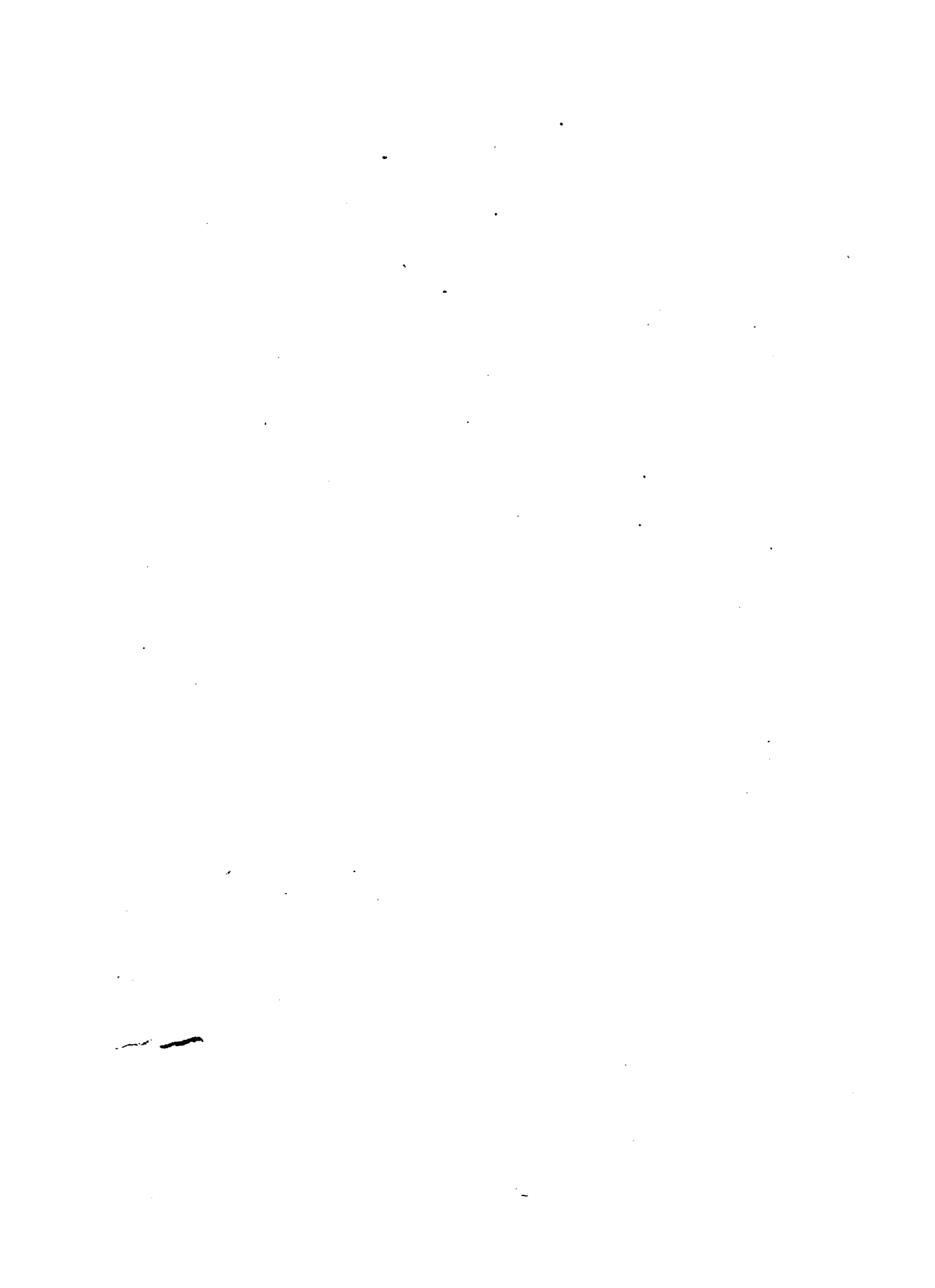
INTRODUCTION AND GENERAL STATEMENTS.

This is the Thirtieth Annual Report of the Secretary of the State Board of Health, and is for the fiscal year ending June 30, 1902. It is arranged in two parts.

The first part contains the secretary's report of work of the Board during the fiscal year; regular and special meetings; president's annual address; general work in the office of the secretary; report of the secretary relative to property; financial statement; abstracts from the quarterly reports of work in the office of the secretary, and of the condition of health during the six months ending June 30, 1902. (The subject of the sickness in the calendar year preceding, is included in the article in the second part of this annual report, therefore the brief article in this first part, relating to the first six months of 1902, brings the subject completely up to date.)

The second part contains abstracts and reports, including a report on "Principal meteorological conditions in Michigan in 1901," one on "Time of greatest prevalence of each disease," being a "Study of the causes of sickness in Michigan," especially in 1901, one on "Communicable diseases in Michigan in 1901," and others on consumption, pneumonia, diphtheria, typhoid fever, scarlet fever, r  theln, meningitis, measles, whooping-cough, smallpox, and other communicable diseases, including chicken-pox, cowpox, syphilis, erysipelas, puerperal fever, itch, mumps (parotitis), tetanus, tuberculosis in animals, glanders (farcy), anthrax, rabies, actinomycosis, meat poisoning and diseased meat, in Michigan in 1901. The second part also contains articles pertaining to loss of life and property alleged to have been caused through the use of kerosene and gasoline and on alleged nuisances.

Reports, etc., required by law.—Much of the work of the State Board of Health, and of its secretary and executive officer, is in the collection, preparation, and spreading of information useful for the restriction and prevention of diseases, and the methods of work are dealt with further on in this report; but, under the law the secretary of the Board is specifically required to disseminate information "through an annual report, and otherwise;" pursuant to which, by direction of the Board, he issues immediately after the close of each week, a bulletin, which shows the diseases which caused most sickness during the week just



X STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

cially to those in whose care public health interests are entrusted, i. e., the health officers. Papers were read and discussed by persons best fitted to offer suggestions upon the various topics assigned to them. Bacteriologists, practical sanitarians, statisticians, active medical practitioners and business men all combined to make this conference one of importance and value.

The conference was attended by many of the most efficient and conscientious local health officers and municipal bacteriologists, by the members of the State Board of Health, and by such of the general public as chose to attend. The proceedings of this conference were not published because of the lack of a stenographic report.

Examination of plans for State buildings,—sewerage, ventilation and heating,—during the fiscal year ending June 30, 1902.—The following is a list of the buildings for which plans and specifications were examined, under Act No. 206, Laws of 1881 (Sec. 2229, Compiled Laws of 1897; Sec. 15, Public Health Laws 1899), during the fiscal year 1902:

Lansing, July 12, 1901—Proposed new heating and ventilating plant for the training school at the State Normal College, Ypsilanti. Additional ventilation for the basement, and a change in the position of the fresh-air registers in the basement, were recommended.

Lansing, July 12, 1901—Proposed new administration building at the State Asylum, Ionia. Plans not approved.

Lansing, July 12, 1901—Proposed woman's building, Michigan Soldiers Home, Grand Rapids. Plans not approved.

Lansing, July 12, 1901—Proposed dining-hall and chapel building at the State Asylum, Ionia. Plans not approved.

Lansing, July 12, 1901—Proposed "Branch building No. 4," at the State Asylum, Ionia. Recommended that the air supply to the "Strong rooms" be taken from outside the building, and not from a basement corridor; that the vent flues be not connected in the attic, but go separately to the outer air; and that the two catch-basins be located where they would not contaminate the air supplies.

Lansing, July 12, 1901—Proposed new heating system at the State Public School, Coldwater. Plans not fully approved. Recommended that, as soon as possible, every occupied room in the institution be heated by indirect radiation and properly ventilated.

Lansing, July 12, 1901—Proposed new building for women patients at the Michigan Asylum for Insane, Kalamazoo. Recommended that the position of a dust chute in the basement be changed so that it would not be liable to contaminate the air supplies; also that the sewer ventilators be carried to the roof inside and not outside the building.

Lansing, July 12, 1901—Proposed new cottages "N," and "O," and for two additions to the kitchen and dining building, at the Upper Peninsula Hospital for Insane, Newberry. The drainage of a ventilating ridge into the sewerage system, and the addition of a fan to an apparently well planned gravity system of heating and ventilation, were not approved.

Detroit, August 13, 1901—Proposed new north wing for the Upper Peninsula Normal School, at Marquette. Fresh-air supplies and ventilation for the shops and two east rooms in the basement, and a fresh-air inlet for the sewer, were recommended. The drainage of a ventilating ridge into the sewer was not approved.

Lansing, October 11, 1901—Proposed new chemical building, a mining and engineering building, and a blacksmith shop and additions, at the Michigan College of Mines, Houghton. Recommended that certain rooms be provided with fresh-air supplies and properly ventilated.

Lansing, October 11, 1901—Proposed new dining-room and kitchen building, at the Michigan State Prison, Jackson. Plans not approved.

Ishpeming, November 8, 1901—Proposed new dining-room and kitchen addition to the State Prison, Marquette. Plans generally approved.

Lapeer, February 6, 1902—Proposed new bacteriological laboratory, and stable for use in connection with the same, at the Michigan Agricultural College. Recom-

mended that instead of several of the rooms heated by direct-indirect radiation, all the rooms, and also the stable, be heated by indirect radiation.

Lapeer, February 6, 1902—Proposed new administration building at the Michigan Home for Feeble-Minded and Epileptic, Lapeer. Suggestions were made relative to a few minor changes in the plans.

Lansing, March 18, 1902—Proposed science and manual training building at the Michigan State Normal College, Ypsilanti. Plans generally approved.

Detroit, June 2, 1902—Proposed new training school to be erected in connection with the State Normal School, Mt. Pleasant, for the State Board of Education. The plans were not approved; but inasmuch as the actual construction of the building had already progressed so far as apparently to make it impracticable to properly install what the Board considers the best systems of heating and ventilation, it appeared quite probable that the plans submitted by the Bryce Heating and Ventilating Co. might be the best that could then be adopted.

Examination and licensing of embalmers.—An important measure from the public health view point, was that advocated by and enacted largely through the efforts of the Michigan Funeral Directors and Embalmers' Association, and which became—

Act No. 233, 1901.

An act to authorize the State Board of Health to determine the qualifications of, and issue licenses to persons engaged in preparing for transportation human bodies dead of infectious or contagious diseases.

The People of the State of Michigan enact:

SECTION 1. The State Board of Health is hereby empowered to issue licenses to persons qualified to properly embalm and disinfect bodies dead of infectious and contagious diseases, such qualifications to be determined by an examination by the State Board of Health.

SEC. 2. These examinations shall be held at Lansing, at least once each year, and at such other times and places as shall be designated by the State Board of Health, for the convenience of candidates for licenses under this act: *Provided*, That the meeting held to examine candidates for license, residing in the Upper Peninsula, shall be held in the Upper Peninsula.

SEC. 3. Applications for licenses shall be accompanied by a fee of five dollars, which shall entitle the applicant to an examination, and to a license if he passes a satisfactory examination. The fees collected by the Board of Health shall be used to defray the expenses incurred by said board in the enforcement of this act, and for no other purposes. Any surplus which may be created under this act shall be covered into the treasury of the State of Michigan at the end of each year for the benefit of the general fund of the State.

SEC. 4. The licenses shall be signed by the president and secretary of the State Board of Health, with the seal of the board attached.

SEC. 5. The State Board of Health is hereby empowered to revoke any license which may have been issued, upon sufficient evidence that the rules and regulations of the board governing the preparation of dead bodies for transportation have been violated.

SEC. 6. The secretary of the Board of Health shall keep a record, in which shall be registered the names and residences of all persons to whom licenses have been granted in accordance with this act, and the number and date of each license. A copy of this record shall be furnished to all those holding licenses, and also to the various transportation companies within the State. The secretary of the Board of Health shall also keep a record of all fees received and expenses paid under this act, and make a report thereof annually to the Governor.

Under this act, four examinations were held during the fiscal year, 1902, as follows: Lansing, September 27, 1901; Ishpeming, November 8, 1901; Lansing, April 11, 1902; and Escanaba, June 5, 1902. Of the four

hundred and sixty-one persons examined, four hundred and forty were granted licenses, and were awarded engrossed diplomas.

Four hundred and forty-eight duplicate transit permit blanks, Form 2, and one hundred and eighty-two of Form 1, were received. Each of these permits was examined, and whenever it was found that the rules of the State Board of Health, or the instructions set forth in the transit permit blank were not complied with, letters were sent, suggesting corrections of methods in the future. Whenever a permit was granted by a local board of health, or health officer, and the certified cause of death was given as not communicable, when in fact it was communicable, a hektographed form, properly filled out, was sent, suggesting that a mistake had been made; if the grantor of the permit did not believe the disease to be communicable it was also suggested that he might use the words, "declared by the State Board of Health to be."

The following papers were printed in connection with the licensing of embalmers by the State Board of Health, during the fiscal year, 1902: Two thousand seven hundred copies of circular "To the Funeral Directors and Embalmers;" 2,600 copies of blanks for application for license under Act 233, 1901; 1,100 copies vest-pocket embalmer's certificate; 41,000 copies of Form No. 1, yellow transit permits; 70,000 copies of Form No. 2, white transit permits; 1,000 copies lithographed embalmers' certificates; 600 copies examination questions, series No. 1; 600 copies examination questions, series No. 2; 1,100 copies of ruled blanks with printed headings, for applicants' use in series No. 3; 7,000 printed circulars, "Transportation of Corpse;" 1,500 copies of the List of Licensed Embalmers; 500 copies "Memoranda Relative to Removal of Corpses," with blanks.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH (UNDER SECTION 6 OF ACT 233, LAWS OF 1901), EMBALMERS' FUND, AS ALLOWED DURING THE FISCAL YEAR, 1902.

Receipts.		Disbursements.	
Fees from applicants for license.....	\$2,355 00	Expenses of members:— Attending meetings..... Other official..... Instruments and books..... Paper, stationery, etc..... Postage:— Office..... Members..... Printing and binding..... Expressage..... Telegrams..... Drawing, engraving, etc..... Compensation of clerks..... Fees returned to applicants..... Miscellaneous..... Unexpended balance turned over to the State Treasurer.....	\$268 26 4 93 317 38 786 25 154 19 25 362 44 8 51 1 90 126 77 224 67 86 60 10 75 3 70
Total receipts.....	\$2,355 00	Total disbursements.....	\$2,355 00

REGULAR AND SPECIAL MEETINGS OF THE STATE BOARD
OF HEALTH, DURING THE FISCAL YEAR
ENDING JUNE 30, 1902.

The minutes of the regular and special meetings of the Board up to and including the meeting October 23, 1888, were copied into the permanent record books in the office of the secretary. From that time and including the proceedings of the meeting May 13, 1898, the minutes have been printed in the annual reports of the Board. The annual report for 1898 is the last one in which the proceedings of the meetings of the Board are printed in full. Commencing with the annual report for 1899 the law of 1899 took effect, and the volume was greatly reduced in size, being limited to 300 pages. Accordingly mention only may be made of the times and places of meetings and members present at each of the regular and special meetings during the fiscal year.

Regular meeting, July 12, 1901.—The members present were: Hon. Frank Wells, President; Dr. Fred R. Belknap, Dr. Collins H. Johnston, and Dr. Henry B. Baker, Secretary.

Special meeting, August 13, 1901, in Detroit.—The members present were: Hon. Frank Wells, President; Dr. Fred R. Belknap, Dr. Victor C. Vaughan, and Dr. Henry B. Baker, Secretary.

Regular meeting, October 11, 1901.—The members present were: Hon. Frank Wells, President; Dr. Victor C. Vaughan, Dr. Fred R. Belknap, Dr. D. A. MacLaughlan, and Dr. Henry B. Baker, Secretary.

Special meeting, November 8, 1901, in Ishpeming.—The members present were: Hon. Frank Wells, President; Hon. Henry A. Haigh, Dr. Fred R. Belknap, and Dr. Henry B. Baker, Secretary.

Special meeting, November 21 and 22, 1901, in Ann Arbor.—The members present were: Hon. Frank Wells, President; Dr. Victor C. Vaughan, Dr. D. A. MacLaughlan, Dr. Fred R. Belknap, and Dr. Henry B. Baker, Secretary.

Regular meeting, January 10, 1902.—The members present were: Hon. Frank Wells, President; Hon. Henry A. Haigh, Dr. Victor C. Vaughan, and Dr. Henry B. Baker, Secretary.

Special meeting, January 21 and 22, 1902, in Caro.—The members present were: Dr. Victor C. Vaughan, Dr. D. A. MacLaughlan, and Dr. Henry B. Baker, Secretary.

Special meeting, February 6, 1902, in Lapeer.—The only member present was Dr. Henry B. Baker, Secretary.

Special meeting, March 18, 1902.—The only member present was Dr. Henry B. Baker, Secretary.

Regular meeting, April 11, 1902.—The members present were: Hon. Frank Wells, President; Hon. Henry A. Haigh, and Dr. Henry B. Baker, Secretary.

Adjourned regular meeting, May 15, 1902, in Detroit.—The members present were: Hon. Frank Wells, President; Dr. Victor C. Vaughan, Dr. D. A. MacLaughlan, Hon. Henry A. Haigh, Dr. Fred R. Belknap, and Dr. Henry B. Baker, Secretary.

Special meeting, June 2, 1902, in Detroit.—The members present were: Hon. Henry A. Haigh, Dr. D. A. MacLaughlan, Dr. Victor C. Vaughan, and Dr. Henry B. Baker, Secretary.

Special meeting, June 5, 1902, in Escanaba.—The members present were: Hon. Frank Wells, President; and Dr. Henry B. Baker, Secretary.

Special meeting, June 19 and 20, 1902, in Pontiac.—The members present were: Hon. Frank Wells, President; Dr. V. C. Vaughan, and Dr. Henry B. Baker, Secretary.

ANNUAL ADDRESS OF THE PRESIDENT OF THE STATE BOARD
OF HEALTH.*

BY HON. FRANK WELLS, PRESIDENT STATE BOARD OF HEALTH, LANSING, MICH.

Members of the State Board of Health:

GENTLEMEN—During the year ended March 31, 1902, this Board has held two Sanitary Conventions, one at Ludington, Sept. 5 and 6, 1901, and one at Caro, Jan. 21 and 22, 1902. A conference of Local Health Officials was held under its auspices at Ann Arbor, Nov. 21 and 22, 1901. All these meetings were successful and in every way satisfactory.

Three meetings of the Board have been held for the purpose of examining and issuing licenses to embalmers, under the Act passed at the last session of the Legislature requiring the Board to perform this duty. The first of these meetings was held at Lansing, Sept. 27, 1901, at the Capitol. Three hundred and seventy persons made application, of whom three hundred and fifty-seven passed the examination and received licenses, and thirteen failed. The next meeting was held at Ishpeming, Nov. 8, 1901. Forty-two applicants were examined and thirty-eight passed. At a second meeting held at Lansing, April 11, 1902, forty-five applicants were examined and at least forty have passed. The passing upon the papers presented in this last examination is not yet completed. Thus far 435 of the 457 applicants have passed satisfactory examinations.

In Michigan, during the past year, there has been a diminution of cases and of deaths from nearly all of the dangerous communicable diseases as compared with the previous year. One notable exception to this satisfactory condition has been an increasing number of outbreaks of smallpox, 766 of these having been reported during the year as against 100 for the previous year. Indications of this increase were perceived early in the year, and it was predicted at the meeting of Local Health Officials at Ann Arbor, in November, that during the approaching winter this disease would prevail to an extent greater than ever before in the history of the State.

The impossibility of preventing the spread of smallpox has been due to the mild form it has assumed, in this State and very generally throughout the country. A large proportion of persons suffering from the disease have been able to attend to their usual avocations without inconvenience, and in very many instances have done so and have thereby permitted the disease to spread to their families and neighbors. Failures to diagnose these mild attacks correctly, both by attending physicians and by health officers at the commencement of outbreaks, have been extremely common, while it has not been unusual to permit the disease to spread throughout an entire community without any effort being made to restrict it through isolation, disinfection, or vaccination, during its progress towards epidemic proportions. People have been assured that the disease was not smallpox, and their fears allayed by calling it Cuban itch, chicken-pox, impetigo, acne and other diseases known and unknown. All the outbreaks have exhibited the same peculiarly mild symptoms, fatal cases having averaged from April, 1900, to April, 1901, only one and three-

*May 15, 1902.

tenths per cent, while from April, 1901, to April, 1902, the mortality was probably less than one per cent. It is safe to assume that had the disease shown any of its old time virulence it would have been promptly stamped out, instead of being permitted to spread as it has to more than half the counties in the State.

If the attitude of the State Board of Health towards smallpox were based wholly upon its death rate at the present time the Board would scarcely be justified in keeping it in the list of diseases dangerous to the public health. But the ancient horror of it still survives and there will always be danger that at some time it may assume its former malignancy, or that the old-time malignant variety of the disease may be again brought into this State. For these reasons a large proportion of the office force of this Board has been kept busy in efforts to restrict its spread during the past year. In cases where the people have made it possible and local health officials have seconded these efforts, the disease has nearly always been restricted to the house where the outbreak occurred. State Communicable Disease Inspector, Dr. Geo. E. Ranney, has been sent to thirteen localities in the State where, by reason of disputed diagnosis of the disease, or for other reasons, local health officials have been unable or unwilling to take the necessary steps for stamping out the disease. His diagnosis has generally been acquiesced in by local health officials and his advice followed. During the year that smallpox has been attracting so much attention it has caused the death in Michigan of thirty-two persons only. During the same period tuberculosis has caused the death of 2,315 persons. Both these diseases, as we know, are preventable. A century ago Jenner discovered how smallpox could be prevented, and today it causes fewer deaths in a year throughout the world than consumption does every day. Twenty years ago Koch discovered the germ of tuberculosis and gave us the key to the prevention of this disease which causes more deaths than any other. What vaccination has done for the restriction of smallpox the destruction of sputum of those ill with consumption has done and is doing for the restriction of that disease.

In both of these diseases obstructionists have endeavored to discredit and prevent the application of the measures which science and experience have shown most efficient for their restriction. Had vaccination and revaccination been general there would not have been the present recrudescence of smallpox. Yet there exist those who, notwithstanding the fact that smallpox had been substantially made to disappear by means of vaccination, still object to the application of it as a preventive measure.

There also exist those who, notwithstanding the fact that consumption is diminishing, refuse to coöperate in the only means for checking the progress of this disease which experience has shown to be efficient. In Germany, where vaccination and revaccination is made compulsory, smallpox is almost unknown. Could vaccination and revaccination be made general in Michigan smallpox would disappear in a few months.

It is probably true of all the other dangerous communicable diseases that if the measures known to be most efficient for their restriction could be enforced they would all rapidly disappear. I know of no more striking illustration of this belief than is afforded by the changes wrought in the health conditions of the city of Havana since it came under the control of the military department of the United States Government. I have watched, as I presume most of you have, these changes as they have

progressed under the direction of Major W. C. Gorgas, Chief Sanitary Officer of Havana. The certainty that yellow fever is spread by means of mosquitoes and not by means of clothing or other articles which have come in contact with the victims of this disease, proven so clearly by the remarkable experiments of Walter Reed, M. D., at Camp Lazear, Cuba, pointed unmistakably to the measures necessary to wipe out, or at least to restrict, this disease.

These measures, the destruction of the mosquitoes which had been shown to be the intermediary hosts and conveyers of the disease from the sick to the well, were thoroughly carried out during the year 1901. The result of this, together with the results in other lines of life saving work, as stated by Dr. Gorgas, in his April report to the Adjutant General's Department of Cuba, is a remarkable showing. Dr. Gorgas says of these: "The report shows much the smallest number of deaths for any March since 1889. The minimum number for this month occurred in 1893, when there were 503 deaths; the maximum, in 1898, when we had 1,519 deaths. The death rate, 20.85, would be excellent for a city of Havana's size in any part of the world. From the table appended, which shows the death rate of cities in the United States, Europe and other parts of the world, it will be seen that Havana's death rate is smaller than that of Baltimore, New Orleans, New York, San Francisco, Liverpool, Manchester, Edinburgh, Barcelona, Madrid, and many other American and European cities.

"Another month has passed without yellow fever, making six months since Havana had a single case. The table in the body of the report goes back to 1889, and if it went back 150 years, the character of the record would be the same. A reference to this table will show that, in the years before 1900, only two months passed in Havana in which no deaths were reported. These months were May, 1899, and April, 1900.

"We have just passed six consecutive months, not only without a death, but without a case. It seems to me that this proves that yellow fever has been eradicated from Havana.

"The last column of this table shows the results with regard to yellow fever that have been accomplished by the mosquito work. Referring to the table, which runs back to the year 1889, it will be seen that the minimum number of deaths from yellow fever was 122, in 1900; the maximum, 1,385, in 1897; average 466. The year of mosquito work, five. It must be remembered, at the same time, that, although I only quote from the period since 1889, the same state of affairs as to yellow fever in Havana has existed since 1762.

"The number of cases of other infectious and contagious diseases is also small. Diphtheria caused one death, typhoid fever seven and leprosy one."

In destroying the species of mosquito which is the conveyer of yellow fever there was a large destruction of the species which conveys malaria. Dr. Gorgas says of the results of this destruction: "While malarial fevers are not required to be reported under the head of infectious and contagious diseases, and are not, therefore, individually cared for as is yellow fever, the general work for the destruction of mosquitoes would be expected to affect malaria also. The reports for the last year show this to be the case, and I am inclined to think that malaria would be eradicated from Havana, just as yellow fever has been, if it were not constantly being introduced from the surrounding country.

"Our statistics show that we had in the neighborhood of 350 deaths

from malarial fever in Havana in 1900. In 1901, the first year of the mosquito work, we had 151. This month, only four. The results with regard to the malarial work in Havana, are very important. Havana is the first city in the world, of any consequence, that has put to practical hygienic use the scientific knowledge with regard to the mosquito as a conveyer of disease, and it is the only place where we can measure the results with any accuracy. We have been at work just one year killing mosquitoes, and have spent in the neighborhood of \$50,000, employing constantly an average of 100 men. The return from this expenditure is represented by the extermination of yellow fever, which annually cost 400 lives, and the saving of about 250 lives per annum from malarial fever. This does not take into account the decrease in the number of sick who recovered and who do not show in the mortality statistics."

In Michigan yellow fever does not exist, and malarial diseases have become quite rare. I call your attention to the accomplishments of Dr. Gorgas, not because, so far as we know, the destruction of mosquitoes in Michigan are now important for the preservation of health, but to show what one man, thoroughly equipped, as is Dr. Gorgas, for life saving work may accomplish, when sustained by authority. But the efforts of Dr. Gorgas did not cease with the suppression of yellow fever and malarial fever. His success with the disease which causes most deaths in Michigan, consumption, is of unusual interest. I again quote from him: "I also invite attention to the large amount of work being done with regard to tuberculosis; in fact, the energies and attention of the Department are directed now principally against tuberculosis. It has always been the cause of the greatest mortality in Havana, as it is everywhere else. The question of yellow fever overshadowed all other things in our early work, on account of its bearing upon commerce and quarantines, but, as far as the question of saving human life is concerned, tuberculosis is more important.

"The Department under the able supervision of Major C. L. Furbush, has established a most comprehensive plan of campaign against this disease. A dispensary has been established, arranged in an attractive manner, and attended by an able corps of physicians, where the municipal poor are invited to apply for assistance. The report shows how successful it has been. Medical inspectors, who dwell very extensively upon the subject of tuberculosis, are systematically sent to tenement houses and tobacco manufactories. The great object of the Department has been to get the cases of tuberculosis located, and through the various measures used we have now about 2,500 cases on our list. These names are carded, with residence and other data, and popular literature sent to them, explaining their disease, its communicability, and the best manner of care. I believe that, if the system can be continued for four or five years, tuberculosis can be eradicated as yellow fever has been. We had nine hundred deaths last year from tuberculosis; placing the average length of a case of tuberculosis at three years, which is a longer period than is generally given to this disease, we would have 2,700 cases of tuberculosis on hand in the city. As we have at present 2,500 located and carded, it may be seen how thorough and successful our system of reporting has been."

The measures used by Dr. Gorgas to combat consumption are precisely those which have been in use in Michigan since 1891. They are, as he

states, the getting of tuberculous cases located and the sending to these victims "popular literature explaining their disease, its communicability, and the best manner of its care." So successful has this been that he believes if the system can be continued four or five years tuberculosis can be eradicated as yellow fever has been. Why is success by this system more marked in Havana than in Michigan? Simply because Dr. Gorgas has authority which enables him to locate substantially every case of this disease in the city. Similar authority would accomplish the same result in the city of Detroit as in the city of Havana. All that is required is that health authorities be furnished with the names and places of abode of persons suffering from consumption, in order that they may supply these victims with information of how they can best care for themselves and avoid infecting their families and friends with the disease.

The knowledge of the names and habitations of consumptives is largely held by physicians. Some report this knowledge to the proper health officials, while many do not. Those who fail are avoiding both moral and legal responsibilities, and should realize that it is their inaction which is retarding the restriction and the eventual eradication of this disease, more than probably all other causes combined.

A year ago I called the attention of this Board to three diseases, which next to consumption cause most deaths in Michigan. These are pneumonia, intestinal diseases of children and cancer. The object in doing this was to determine if anything can be done by the Board for the restriction of either or all these diseases. With the exception of a pamphlet on pneumonia and a leaflet on the prevention of cholera infantum and kindred diseases, neither disease has received very active efforts from this Board looking to its restriction, and there seemed to be good reason, owing to their importance, that the Board carefully consider if some steps should not be taken with this object in view. A committee was appointed to consider each of these diseases; but up to the present time but one report has been made, a verbal one, upon cancer, by Dr. Belknap. [Later, at this meeting, Dr. MacLachlan presented and read a report relative to pneumonia; and Dr. Vaughan verbally reported progress in the preparation of a revised edition of the leaflet on the intestinal diseases of children.]

During the past year, as reported in the Bulletin of Vital Statistics, issued from the office of the Secretary of State, deaths from pneumonia were 2,760, exceeding those reported through the same source from consumption. From intestinal diseases of children there were 1,654 deaths, and from cancer 1,460. In all 5,874 deaths from these three diseases during a single year. Must the people of the State of Michigan look in vain to its State Board of Health to make some effort to reduce this great mortality? In the past this Board has usually been a leader in the adoption of measures for the restriction of the diseases causing most deaths. The importance of all these diseases as causes of sickness and death has greatly diminished, and it will continue to diminish more and more rapidly as the years go on.

Shall not this Board again take the initiative in seeking for measures to restrict these other diseases which seem to be taking the places of those already partially conquered?

GENERAL WORK IN THE OFFICE OF THE SECRETARY OF THE
STATE BOARD OF HEALTH DURING THE FISCAL
YEAR ENDING JUNE 30, 1902.

Much of the work of this office naturally groups itself under three heads,—the collection of information, the compilation and elaboration of information, and the dissemination of information. In the following outline that grouping is adhered to so far as is practicable without repetition.

COLLECTION AND COMPILATION OF INFORMATION.

Return of names and postoffice addresses of health officers.—There is a local board of health in every township, and in every incorporated city and village in Michigan.

Every local board of health in Michigan is required by law to appoint and constantly have a health officer, and to report his name and address to the Secretary of the State Board of Health at Lansing.

Blanks for the return of the names and addresses of health officers are sent out by the Secretary of the State Board to the local health officers about the first day of April, the law (Sec. 4411, C. L. 1897; Sec. 46, P. H. L. 1899) requiring the appointment and return to be made "within thirty days after the annual township meeting in each year."

In April, 1902, the usual demand was made upon supervisors of townships, presidents and clerks of villages, and mayors and clerks of cities, for the return of names and postoffice addresses of health officers to serve in 1902-1903. The circular and blank forms are similar to those printed on pages xiii-xiv of the report of this Board for 1884. In June, 1902, a second demand was sent to localities from which no return had been made in response to the demand in April. On the outbreak of a dangerous communicable disease in a township, city or village, in which no health officer had been reported, a third and even a fourth demand for the appointment of such officer, and the return of his name has been made; therefore, the number of health officers returned increases until the close of the year for which such officers are appointed. At the close of the fiscal year ending June 30, 1902, the numbers of health officers in townships, cities and villages returned for the years 1901-1902 were approximately as follows: Townships, 1,206; cities, 79; villages, 307.

Through the systems of reports to the State Board of Health by its corps of correspondents, as well as by the local health officers, by the systematic searching of the local columns of country newspapers published in Michigan, and by a diligent search of the reports of deaths to the Division of Vital Statistics in the office of the Secretary of State, the Secretary of the State Board of Health often receives information of an outbreak of a communicable disease and desires to communicate at once with the local health officer; but if no health officer has been appointed in that locality, or no return of such appointment has been made, delay occurs, and before the secretary is able to establish authentic communication with the local board of health, and a health officer can be chosen, the disease may spread widely within or without the limits of a village or a township, with unnecessary sickness and loss of life.

It should be said, however, that there is an increasing tendency to comply with this law, and local boards now generally act promptly and cooperate cordially with the State Board of Health in its endeavors to prevent the spread of dangerous communicable diseases.

Special reports relative to dangerous communicable diseases.—Every health officer is supplied with blanks [L] from this office, for reporting outbreaks of diphtheria, scarlet fever, typhoid fever, smallpox, measles, etc. (dangerous communicable diseases), to the Secretary of the State Board as required by law. A special blank [S] for reporting outbreaks of consumption is also supplied local health officers.

Upon the receipt of the report of an outbreak of such disease, blanks [M] for weekly reports so long as the outbreak lasts, are sent, with a circular letter, also a number of pamphlets containing instructions for the suppression of the disease. These pamphlets are to be distributed to the neighbors of the family in which the disease is, in order to educate them to the importance of their duty under the law, and to secure their cooperation with the health officer.

About 5,881 outbreaks of such diseases were thus attended to during the fiscal year, 1902.

Later, a blank is sent to the health officer of each jurisdiction for a final report at the close of the outbreak, stating just what was done for the restriction of the disease, and with what result—the number of cases and deaths, households invaded, what disinfections were used, what exceptions, and other facts supplying data for guidance of future efforts.

The facts thus collected are compiled for publication in the annual report of the Secretary of the State Board of Health. In this annual report will be found the report of the facts relative to the dangerous communicable diseases in Michigan in the year 1901.

Annual reports by health officers for the year ending December 31, 1902.—In January, 1902, a circular [218] was sent to the health officer of each township, city and village in the State, about 1,592 in all, transmitting a blank form [I] for use in making his annual report to this office. This circular was substantially the same as circular [65] which is printed on pages viii-ix of the report for 1884. Blank form [I] for reports of health officers is printed in former reports. With the circular [218] was also transmitted a blank for a copy of a record of diseases dangerous to the public health, similar to the blank which is printed on page 271 of the report for 1882.

Where the name of the health officer has not been returned the blanks were sent to the president of the village, the mayor of the city, or the supervisor of the township, according as the vacancy occurred in a village, city or township.

In case this failed to secure the return in accordance with the State law, the aid of the prosecuting attorney was requested. This has had the effect of securing a more complete return of reports of health officers.

Annual reports by clerks of local boards of health discontinued.—Since the change of the law (Secs. 4452 and 4453, Compiled Laws 1897; Secs. 87 and 88, Public Health Laws 1899), went into effect, reports of cases of "diseases dangerous to the public health" are not made by the clerk; and, unless it has been impracticable to secure a satisfactory report from the health officer, no demand was made upon the clerk for an annual report.

Meteorological reports.—A list of meteorological observers for the calendar year 1901, with a statement of what registers were received from each, is printed in this report. The reports are summarized in an article in this report on "The Principal Meteorological Conditions in Michigan in 1901," commencing on page one of Part II. The data are of great value for the purpose of studying the causes of diseases. The observations made at the office of the Board at Lansing have been summarized weekly, and a copy placed on file in the office.

DISSEMINATION OF INFORMATION.

Published list of names and addresses of health officers.—The names and addresses of 1,476 health officers in Michigan, to serve in 1901-1902, were collected and printed.

Distribution of information how to restrict and prevent dangerous communicable diseases.—Whenever information was received of the first occurrence of diphtheria, scarlet fever, typhoid fever or typho-malarial fever, measles, whooping-cough, consumption, smallpox or cerebro-spinal meningitis, copies of a document on the restriction and prevention of the disease reported were immediately sent to the health officer with a request that he distribute them where they will be most likely to be read, and it was suggested that the neighbors of those families in which the sickness occurs would be most likely to read them at such times of danger, and it was thought that after reading them they will be most likely to coöperate with the local health officer for the restriction of the disease. Thousands of pamphlets on the most dangerous communicable diseases are distributed by the State Board of Health in this manner, in localities where the disease treated of in the pamphlet is present. They are being distributed in this way all the time, because there is no time when the State is free from consumption, scarlet fever and diphtheria, these being the most important of the dangerous communicable diseases in Michigan. Copies of the documents on diphtheria, scarlet fever and smallpox, in German or in Dutch, are also sent when it is thought they can be used to advantage. Owing to frequent requests for documents in French, Polish, Swedish and Danish Norwegian, translations of a leaflet [47] on contagious diseases have been made into each of these languages, and copies sent to local boards of health when requested.

A record is kept of reports received, and of correspondence relative to each outbreak of a dangerous communicable disease of which the office receives information. A compilation of such information relative to the most important diseases is published in this volume.

Printing and distribution of the secretary's annual report.—Comparatively few copies of the annual report of the secretary are published; the whole number is not so large as the number of officers and members of local boards of health in Michigan. In accordance with the provisions of Section 10, Act No. 44, Laws of 1899 (Sec. 14, Public Health Laws 1899), only 4,000 copies of the annual report are published, 2,000 copies less than have ordinarily been published, but about the same number of copies is allowed for distribution by the Secretary of the State Board of Health (about 3,800). The reports are sent in exchange to sanitary journals, other State Boards of Health, local health officials in Michigan, city boards of health in other States, health officials in other

countries, libraries, correspondents of the Board, and to persons who request copies of the report.

Instructions to newly appointed health officers.—As fast as the names and addresses of health officers to serve in 1901-1902 were received, a copy of the bulletin* [120] detailing the duties of health officers and of local boards of health, was sent to each one who had not served during the preceding year, together with blanks "L" and "M" for the prompt report of any dangerous communicable diseases, and sample copies of pamphlets on the restriction and prevention of diphtheria, scarlet fever, typhoid fever, measles, whooping-cough, meningitis, smallpox and consumption; also a slip [224] relative to consumption being a dangerous communicable disease, and a short statement relative to its restriction and prevention; a leaflet [281] on the modes of spreading and the best methods for the restriction and prevention of dangerous communicable diseases; several leaflet diagrams showing the results for recent years in the restriction of diphtheria, scarlet fever, typhoid fever, measles and consumption, and two diagrams showing a comparison between the numbers of deaths from typhoid fever in sewered and unsewered localities.

The Teachers' Sanitary Bulletin is now in its fifth volume. During the fiscal year 1902, 25,000 copies for each of the months of July and August, 1901, and for January, February and April, 1902; and 23,000 copies for the months of September, October, November and December, 1901, and May and June, 1902; and 30,000 copies for March, 1902, were printed; aside from a large number of shorter articles and items relating to various phases of public health work and teaching, the following articles appeared in the Bulletin: Infectiousness of Milk of Tuberculous Cows, by Henry B. Baker, M. D. (July, 1901); Powers and Duties of Health Officers and Health Boards, by B. P. Hicks (August, 1901); The Restriction of Scarlet Fever, by Guy L. Kiefer, A. M., M. D. (September, 1901); The Hygiene of the Home, by Hon. Frank Wells (February, 1902); Public Schools and Vaccination, by L. D. Woodworth (March, 1902); Sanatoria for Consumptives, by C. P. Ambler, M. D. (April, 1902), and Benefits of Sanatorium Treatment of Consumptives (June, 1902).

This Bulletin is published to enable the teachers in the public schools of the State to better comply with the provisions of Act 146, of 1895, which requires that facts relative to the modes of spreading, and best measures for the restriction and prevention of the dangerous communicable diseases be taught in every public school. It is sent gratuitously to all teachers whose names and addresses can be obtained. The secretary will be grateful for all information relative to the names and addresses of teachers in Michigan, or changes therein.

Reprints.—Reprints of articles in the report and in proceedings of sanitary conventions, have been made in pamphlet form, and sent in answer to queries in letters that can be best answered in that manner.

Instructions to local health officers by telephone, telegraph, etc.—There are in Michigan about 4,500 officers of local boards of health (presidents, clerks, and health officers), many of whom are newly appointed each year, and coming to the work for the first time, need to ask many questions in order to be best prepared to serve the people in their several localities. As fast as such emergencies arise such questions are replied to by tele-

* Published under Sec. 15, Act 44, Laws of 1899.

phone, telegraph, letters, or otherwise as the occasion demands. This is one of the important functions of the central office, of the secretary and executive officer of the State Board of Health.

Diagrams of instructive experience in Michigan.—Diagrams showing the favorable results of isolation and disinfection of diphtheria, scarlet fever, typhoid fever, smallpox, and the generally favorable results of isolation and disinfection, lives saved by public health work in Michigan, deaths from typhoid fever in sewered and unsewered localities and in cities before and after the introduction of sewerage, the relation of low water in wells and the deaths from typhoid fever have been printed and largely distributed. The evidence relative to the effect of isolation and disinfection as a preventive of the dangerous communicable diseases, gains strength as shown by the diagrams for each succeeding year compared with periods of years. The diagrams prove that in those localities in which isolation and disinfection of diphtheria and scarlet fever were enforced, only about one-fifth as many deaths occur as in those localities where isolation and disinfection are neglected. The diagrams relative to the other diseases show a greater or less proportion of life-saving through isolation and disinfection.

Pamphlets and other publications of the office.—Aside from a number of diagrams and leaflets which were printed during the year but which cannot well be enumerated here for lack of space, the first edition of "Nuisances. Their Abatement and Prevention," was printed July, 1901, citing the law under which the local boards of health should make regulations relating to nuisances, and suggesting actions to be taken by local boards of health. The seventeenth edition of "The Restriction and Prevention of Scarlet Fever" was printed in July, 1901; the seventeenth edition of "The Prevention and the Restriction of Typhoid Fever" was printed in July, 1901, followed by the eighteenth edition in May, 1902; the eighteenth edition of the "Restriction and Prevention of Diphtheria" was printed in July, 1901; the third edition of "Advice for the Restriction and Prevention of Meningitis" was printed in August, 1901; the second, amended, edition of "Relative to what are Communicable Diseases Dangerous to the Public Health" was printed in December, 1901; an edition of "Vaccination and Revaccination,—the Prevention of Smallpox" was printed in December, 1901; the twelfth edition of "Dangerous Communicable Diseases: How Spread, How Restricted and Prevented" was printed in February, 1902; the eleventh edition of "The Restriction and Prevention of Measles" was printed in March, 1902; the fifth edition of "Restriction of Smallpox" was printed in May, 1902; reprints were also made of some of the articles in the annual report for 1901.

Immigrants possibly exposed to dangerous communicable diseases.—During the fiscal year, 1902, three notices were received from the U. S. Commissioner of Immigrants at Philadelphia, Pa., that measles had occurred on board three steamships arriving at that port. Twenty-three notices were received from the Dominion Immigration officers, Canada, that measles had occurred on board twelve steamships; measles, tonsillitis and chicken-pox on board one steamship; measles, smallpox and chicken-pox on board one steamship; measles and scarlet fever on board two steamships; measles and mumps on board one steamship; scarlet fever on board three steamships; smallpox on board one steamship; typhoid fever on board one steamship; and chicken-pox on board one steamship, arriving at Canadian ports. The notices give the names and

destinations of immigrants on board those steamships intending to settle in Michigan. Copies of these notices, including the lists of the names of the immigrants, were promptly sent from this office to the health officers of the jurisdictions where the immigrants intended to settle. When a disease, similar to that to which immigrants have been exposed, occurs within sixty days after their arrival in any locality in the State, indicating a probable connection between such outbreak and the arrival of the immigrants, mention is made of the same in the article on "Communicable Diseases in Michigan in 1901," in a subsequent part of this report.

Publication of proceedings of meetings of the State Board of Health.—Abstracts and brief accounts of the proceedings of meetings of the State Board are prepared, neostyled, and distributed as soon as practicable after each meeting. Abstracts of the minutes of meetings have in former years been printed in Part I of the secretary's annual report, but since the report for 1899 they have been omitted from the report on account of the restriction of the size of the volume; but a record is kept in the office of the secretary. The distribution of these abstracts is not the same for all meetings, being to different classes of persons according to the nature of the contents, as the action of the Board or its deliberations may be appropriate. In some instances they are sent to sanitary and medical journals, in others to teachers, health officers and others, and frequently to the members of boards of control of the different State institutions.

Secretary's quarterly reports of work in the office.—At the close of each quarter, the secretary prepares a brief report of the work done in the office. This report is presented, and portions of it sometimes read at the next regular meeting; and, if the abstract of the proceedings of the meeting is printed, this report is printed in the same pamphlet. It has not been practicable to print the quarterly abstract of proceedings of meetings in this fiscal year.

REPORT OF THE SECRETARY RELATIVE TO PROPERTY, ETC., FOR THE FISCAL YEAR ENDING JUNE 30, 1902.

To the President and Members of the Michigan State Board of Health:

GENTLEMEN—In compliance with Section 5 of Article II of the by-laws of this Board, the following report of the "Nature and amount of property belonging to the Board, which has been received, issued, expended, and destroyed since the last report, and of property remaining on hand, and also in whose care each item of property is intrusted," is respectfully submitted:

Preceding reports should enable one to learn the items of property on hand at the beginning of the fiscal year 1901. My last report is printed on pages xxix-xxx of the Annual Report for 1901. Since last report, instruments and articles of a similar nature have been purchased as follows:

*Photo-engraved plates purchased.**

- Two plates—The human frame.
- One plate—Typical smallpox scarification for vaccination.
- One plate—Seal of the State of Michigan.
- Five plates relating to weekly reports of sickness in Michigan in 1899.

* In some instances out of one fund, and in other instances from another fund; some, for illustrating the annual report of the Board, were ordered paid for by the Board of State Auditors.

One plate—Isolation and disinfection restricted scarlet fever in Michigan in 1900.
 One plate—Distribution of consumption reported in Michigan in 1900.
 One plate—Isolation and disinfection restricted typhoid fever reported in Michigan in 1900.
 One plate—Deaths by yellow fever in Havana, Cuba.
 One plate—Reported deaths from consumption in Michigan, 32 years, 1869-1900.
 One plate—Isolation and disinfection restricted diphtheria in Michigan in 1900.
 One plate—Isolation and disinfection restricted diphtheria in Michigan; 10 year and 3 year periods.
 One plate—Case of smallpox, Hart, Michigan.
 One plate—Mild case of smallpox, Saginaw Co., Michigan, in 1901.
 One plate—Reported deaths from scarlet fever in Michigan, 33 years, 1868-1900.
 One plate—Isolation and disinfection restricted measles, 11 years, 1890-1900.
 One plate—Movements of contagium of smallpox in 1900.
 One plate—Isolation and disinfection restricted smallpox in Michigan in 1900.
 Fifteen plates relating to meteorological conditions in Michigan in 1900.

Property loaned.

Many photo-engraved plates were loaned to Wynkoop, Hallenbeck, Crawford Co., State Printers, Lansing, to be used in printing annual reports and other publications of this Board. Most of these plates have been returned, but a few still remain charged to them in the property book of this office. The plates will probably be returned as soon as the State Printers are through with them.

Instruments purchased.

One bull's-eye lamp for taking meteorological observations.
 One twelve-inch boxwood triangular scale; divisions one-tenth to one-sixtieth part of an inch.

Meteorological instruments issued.

The meteorological instruments in care of S. Alexander, Birmingham, were turned over to Mrs. Benita A. Dyer, Birmingham, without coming to this office, January 1, 1902.
 One barometer and box for protection, one dry-bulb thermometer, one wet-bulb thermometer, board, clips, cup and wick, one maximum and one minimum registering thermometer, with boards, etc., for hanging. One galvanized iron rain-gauge, with overflow tube and measuring stick to Prof. Delos Fall, Albion, Michigan.

Meteorological instruments returned.

One standard thermometer, by W. C. Haines.
 One dry-bulb thermometer, by William F. Davis.
 One psychrometer board, clips and cup; one minimum self-registering thermometer; one barometer box for protection; one wet-bulb thermometer; one board for hanging registering thermometers, by E. S. Pettyjohn, M. D.

Meteorological instruments accidentally broken while in use by observers.

One minimum registering thermometer, in care of W. C. Haines.
 One barometer, No. 2581, tube broken by observer at Birmingham.
 One dry-bulb thermometer; one barometer, No. 2252, tube broken, by observer at Alma.
 One dry bulb thermometer spoiled by rust and tube broken.

Meteorological instruments and other property on hand.

7 standard barometers (including one in use in this office).
 7 dry-bulb thermometers (including one in use in this office).
 7 wet-bulb thermometers (including one in use in this office).
 1 standard thermometer.
 7 maximum self-registering thermometers (including one in use in this office).
 4 minimum self-registering thermometers (including one in use in this office).
 1 standard thermometer for inspecting oils.
 8 registering thermometer boards (including one in use in this office).
 Barometers Nos. 2581, 2809 and 2586 were repaired and adjusted by Henry J. Green, N. Y.
 14 psychrometer boards (including one in use in this office).
 2 psychrometer cups (including one in use in this office).
 8 minimum thermometer clips.
 6 psychrometer clips.
 9 screw bolts for registering thermometers.
 10 pins for registering thermometers.
 3 hooks for hanging barometers.
 6 barometer boxes.
 2 rain-gauges (including one in use in this office).
 2 caps for overflow tubes.
 1 large galvanized iron pail, to measure snowfall.
 1 Draper's self-registering thermometer.
 2 anemometers for use in this office.
 2 circular magnifying hand-glasses.
 9 psychrometer cups, injured by use, can be repaired.
 4 psychrometer cups, spoiled by rust and long use.
 36 broken thermometers (includes all, since observations have been taken).
 1 hard rubber triangle, 13 inch.
 1 hard rubber triangle, 6 inch.
 1 dotting instrument.
 1 adjustable curve ruler.
 1 parallel ruler, wood.
 1 parallel ruler, hard rubber.
 210 sheets ozone test-paper.
 3,960 ozone slips.

xxvi STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

The following table shows the amount and kind of hard paper there was on hand at the time of making the last report, the amount purchased during the year ending June 30, 1902, the amount used, and the amount on hand at close of year:

Kind of paper.	On hand at last report.		Purchased since last report.		Used during the fiscal year.		On hand June 30, 1902.	
	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.
Flat.....			10		2	348	7	132
Crown.....	2	100	10		8		4	100
Demy.....	4	133	10			160	13	453
B. Horner (linen).....	1	290	1		1	8	1	282
Folio post.....	21	402	104		42	54	83	348
Medium.....		276	4			208	4	68
Imperial.....	1						1	
Letter heads, office (linen).....		12,337				7,337		5,000
Letter heads, members (linen).....		390		2,000		1,740		650
Foolscap.....		420				60		360
Legal cap.....		320				62		258
Blotting paper.....		400	1			400	1	
Blue cover paper.....	8	340			2	40	6	360
P. O. paper.....	1	200					1	200
Book paper, S. S. S. white.....		400						400
Manilla paper.....	3		4	360	4	450	3	390

There are now on hand 5,600 sheets of hard paper of half-letter size. There were about 236,131 envelopes on hand at the time of making the last report; 253,000 of the various kinds used in the office have been purchased since, making a total of 489,131. There are now on hand 100,159 printed envelopes, and 169,195 blank envelopes, making a total of 269,354. About 219,777 have been used in the work of the office.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH (UNDER ACTS 81, 1873, 241, 1881, AND 140, 1901), AS PER VOUCHERS 3290-3292, 3294, 3296-3309 INCLUSIVE, 3311-3316, 3318, 3327-3454 INCLUSIVE, 3456-3459, 3461, 3463-3478, 3495, 3499 AND 3501, DURING THE FISCAL YEAR ENDING JUNE 30, 1902.

Expenses of members:—		
Attending meetings	\$144 64	
Other official	442 57	
Engraving, drawing, etc.....	4 50	
Instruments and books.....	147 73	
Paper, stationery, etc.....	958 77	
Postage:—		
Office*	2,110 39	
Members	1 35	
Printing and binding.....	840 56	
Secretary	3,000 00	
Expressage	66 34	
Telegrams	54 54	
Telephone	55 35	
Miscellaneous	173 05	
Total	\$7,999 79	

*By authority of Act 140, Laws of 1901. \$331.32 of this amount was for postage before the beginning of this fiscal year.

SUMMARY FROM QUARTERLY REPORTS, FISCAL YEAR 1902. xxvii

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH UNDER ACT 142, 1897, AS PER VOUCHERS 156, 161, 163-199, INCLUSIVE, 202 AND 204, DURING THE FISCAL YEAR ENDING JUNE 30, 1902.

Engraving, drawing, etc.....	\$28 95
Instruments and books.....	11 20
Paper, stationery, etc.....	977 97
Postage:—	
Office (amount appropriated, \$500.00; amount used, \$145.59; unexpended balance, working fund, \$354.41).....	500 00
Printing and binding.....	887 88
Expressage	28 21
Miscellaneous	24 94
Total	\$2,459 15

EXPENDITURES ON ACCOUNT OF THE BOARD.

Note.—The appropriations (\$10,500.00) at the disposal of the State Board of Health are for certain specified purposes, not including clerk hire, the publication of the annual report, or the expenses in the examination of plans for public buildings; those expenditures *on account of*, but not by the Board, are provided for by other acts of the legislature than those appropriating money to be expended by the Board, and the accounts are kept in other offices; not in the office of the State Board of Health. The accounts for clerk hire are kept by the Auditor General, and are reported in his annual report; the accounts for the publication of the annual report of this Board, and in the examination of plans for public buildings, are kept by the Board of State Auditors, and are published in the annual report of that Board.

Respectfully submitted,
HENRY B. BAKER,
Secretary.

SUMMARY FROM THE QUARTERLY REPORTS OF WORK IN THE OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH, AND OF THE CONDITION OF HEALTH IN MICHIGAN DURING THE SIX MONTHS ENDING JUNE 30, 1902.

For each regular meeting of the State Board of Health, the Secretary prepares a report of work in the office, and of the condition of health in Michigan, during the preceding quarter.

In another article, further on in this volume, entitled "Communicable Diseases in Michigan During the year 1901," is a summary, relative to the year 1901, abstracted from the quarterly reports.

This article is a similar summary, from the quarterly reports, for the succeeding six months, being the first six months of the calendar year 1902,—the last half of the fiscal year 1902, for which year this volume is the annual report. This article brings the subject up to the latest date possible, for this report.

A summary of a few portions of the quarterly reports during the six months ending June 30, 1902, is as follows:

Dangerous communicable diseases.—The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office for the six months ending June 30, 1902, are as follows: For consumption, 726; for diphtheria and croup, 242; for typhoid and typho-malarial fever, 336; for scarlet fever, 582; for measles, 429; for whooping-cough, 155; for meningitis, 241; and for smallpox, 524. Total for the eight diseases, 3,235.

The number of communications relative to dangerous communicable diseases, received and placed on file, was 15,467.

The number of communications relative to dangerous communicable diseases sent out, was 12,839.

The final reports of outbreaks received and filed were: For consumption, 832; for diphtheria and croup, 231; for typhoid and typho-malarial

xxviii STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

fever, 317; for scarlet fever, 632; for measles, 308; for whooping-cough, 90; for meningitis, 183; and for smallpox, 512. Total for the eight diseases, 3,105.

The registration and return of deaths in Michigan, to the State Department, has resulted in giving this office the first information of the occurrence of 561 deaths from consumption; 52 deaths from diphtheria and croup; 79 deaths from typhoid and typho-malarial fever; 28 deaths from scarlet fever; 22 deaths from measles; 41 deaths from whooping-cough, and 183 deaths from meningitis. A total for the seven diseases, of 966.

The local columns of 5,928 newspapers have been looked over for reports of occurrence of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 25 cases of consumption; 4 outbreaks of diphtheria; 28 outbreaks of typhoid and typho-malarial fever; 15 outbreaks of scarlet fever; 24 outbreaks of measles; 7 outbreaks of whooping-cough; 2 cases of meningitis, and 19 outbreaks of smallpox. A total for the eight diseases of 124. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table.

TABLE 1.—FIRST SIX MONTHS OF 1902.—*Exhibiting the number of outbreaks of consumption, diphtheria, typhoid fever, scarlet fever, measles, whooping-cough, meningitis, and smallpox, from January 1 to June 30, 1902, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent of reports relative to which no reply was received from the health officer.*

	Reports from all sources January 1 to June 30, 1902.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Consumption.....	726	3	40	8	52
Diphtheria.....	242	2	0	50	50
Typhoid fever.....	336	8	21	43	36
Scarlet fever.....	582	3	40	27	33
Measles.....	429	6	50	4	46
Whooping-cough.....	155	5	29	14	57
Meningitis.....	241	1	0	100	0
Smallpox.....	524	4	37	21	42
Average for the 8 diseases.....		4	35	22	43

Work in connection with sickness statistics.—When a return of the name of a new health officer was received, the printed circular [180] demanding the weekly card reports of sickness, and a hektographed circular letter describing the plan of making the card reports, together with supplies for making the reports, were sent to the health officer of each city and village, who were physicians, in active general practice of medicine. It must be remembered that the following applies only to the work on sickness statistics for the first six months of 1902, and that for the work of the calendar year 1901, reference must be made to the article on sickness statistics beginning on page 58 of this report. During the first six months of the year 1902, 3,915 blank report, receipt and return postal cards, 313 weekly record books, and 558 printed, hektographed and typewritten letters, were mailed to health officers of cities and villages, and to such physicians, in active practice of medicine, who expressed a willingness to make the reports voluntarily. About 2,989 weekly postal card reports were received and entered on the register.

The sickness statistics of Michigan, based upon these weekly card reports, are probably the most important sickness statistics in the world, and are made especially useful for the purpose of studying the climatic causation of diseases, by reason of the excellent meteorological statistics which have been collected for a long series of years. The general plan of the weekly card reports, the sickness statistics obtained from the compilation of the weekly card reports received during the year 1901, and the data obtained from the meteorological observations during the year 1901, may be found on pages 1 to 104 of this report.

An ephemeral use is made of the data contained in the weekly card reports, and of the meteorological observations at Lansing, by the publication of weekly, monthly and quarterly bulletins, "Health in Michigan." Samples of the several bulletins may be found on page 85, Report for 1891, pages lxxix, and xcii-xciii, report for 1894, and pages lxxxvi-lxxxvii, report for 1898. During the first six months of 1902 about 115 copies of the weekly bulletin were mailed each week, and about 125 copies of the monthly bulletin were mailed each month, to members of the State Board of Health and other officials and persons interested in keeping a "finger on the public pulse," also to a number of newspapers and sanitary and medical journals. The weekly and monthly bulletins are mentioned on pages 60 and 61 of this report.

Meteorology at one central station, and sickness throughout Michigan from all causes, during the first six months of 1902, being the last six months of the fiscal year compared with the first six months of 1901.—A comparison of meteorological conditions, at Lansing, for the first six months of 1902, with the meteorological conditions for the first six months of 1901, shows that in 1902 the prevailing direction of the wind was southwest, instead of northwest, the velocity .9 of a mile per hour greater, the average temperature 1.59 degrees higher, the average daily range of temperature .48 of a degree greater, the average daily range of atmospheric pressure .006 of an inch less, the precipitation .63 of an inch more, the absolute humidity slightly more, the relative humidity less, the day and night ozone more, and the depth of water in the observation well 1 inch more. This data relative to the calendar year 1901 is printed in the article on meteorology, beginning on page 1 of this report.

XXX STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

Compared with the first six months of 1901 the reports from all sources indicate an increased prevalence in the sickness from measles, whooping-cough and smallpox; and a decreased prevalence in diphtheria, erysipelas, typhoid fever and influenza, in the first six months of 1902.

The weather and the health in Michigan, in the first six months of 1902, compared with the average for the corresponding six months in the ten years 1892-1901.—A comparison of meteorological conditions, at Lansing, for the first six months of 1902, with the average for the corresponding six months in the ten years, 1892-1901, shows that in 1902 the prevailing direction of the wind was southwest, instead of northwest, the velocity .1 of a mile per hour greater, the average temperature .6 of a degree higher, the average daily range of temperature .28 of a degree greater, the average daily range of atmospheric pressure .02 of an inch less, the precipitation .48 of an inch more, the absolute humidity slightly less, the relative humidity less, the day ozone more, the night ozone less, and the depth of water in the observation well 8 inches less.

Compared with the average in the corresponding six months in the ten years, 1892-1901, the reports from regular observers indicate that typhoid fever, scarlet fever and smallpox were more prevalent than usual; and consumption, intermittent fever, remittent fever, cholera morbus, diphtheria, dysentery, erysipelas, and influenza were less prevalent than usual, in the first six months of 1902.

[PART II.]

PRINCIPAL METEOROLOGICAL CONDITIONS IN MICHIGAN
IN 1901.

COMPARISONS OF CONDITIONS IN 1901 WITH THOSE IN PRECEDING YEARS.

A COMPILATION OF REPORTS BY OBSERVERS FOR THE STATE BOARD OF HEALTH
AND FOR THE UNITED STATES WEATHER BUREAU.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE MICHIGAN STATE BOARD OF HEALTH.

In the annual reports of this Board, there has been published for each of the years 1877 to 1900, inclusive, a summary relative to the principal meteorological conditions observed during the year. This paper continues the subject for the year 1901. The names of the observers for that year, and the months in that year for which copies of registers of meteorological conditions were received from each, are stated in Table I. In Table II, is given the latitude, longitude, and elevation of each of these stations. In the tables, reports received from any observer for less than half the year have not been used; in some instances the "casual phenomena," not in tabular form, are used.

The principal conditions treated in the tables are temperature, relative and absolute humidity of the air, cloudiness, fogs, rainfall, ground-water levels, ozone, velocity and direction of the wind, and pressure of the atmosphere. The facts in a table on the subject of such important meteorological condition is illustrated by a diagram representing to the eye variations in the given condition from month to month through the year, at the several localities represented.

Some of these tables give not only the meteorological conditions for the year and month under consideration, but they also contain, for purposes of comparison, statements of the average conditions for the longest period available in each case.

In the latter part of the annual report for 1886, there was published an article on "The Causation of Pneumonia," in which extensive use was made of meteorological statistics, especially those relating to the meteorology of Michigan. In the annual report for 1887, in an article on "The Causation of the Cold-Weather Diseases," influenza, tonsillitis,

2 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

bronchitis, scarlet fever, diphtheria, and smallpox are proved to sustain very close relations to meteorological conditions. Extensive use of meteorological and sickness statistics is made in the report for 1887, in an article entitled "The Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-Passages." In the report for 1891, "Abstract of Proceedings, April 14, 1891," in a discussion on the subject of "The Causation of Influenza," is an important use of the meteorological data, with diagrams and other evidence, showing how closely influenza is associated with atmospheric temperature, humidity, ozone, and wind. In the report for 1891, page cxxvii, is an article entitled "Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-Passages in Colorado," in which are also data relative to other States and countries. In the report for 1894, pages clix-cxciv, is a paper on "The Causation of Influenza and Allied Diseases with Suggestions for their Prevention," in which important use is made of the meteorological data collected in Michigan since 1877. In each of the annual reports of this Board since that for the year 1877, considerable use has been made of the sickness statistics in Michigan for the complete study of which, data of the meteorological conditions coincident with the sickness is required.

TABLE I.—Names of observers whose reports are summarized in the following meteorological tables and diagrams, their places of observation, and the counties and geographical divisions of the State in which these places are situated, and months for which reports were received from each observer.

Name of observer.	Place of observation.	County.	Divisions of the State.*	Months (inclusive) for which registers were received.
Henry R. Patrick, Observer, U. S. Weather Bureau.....	Marquette.....	Marquette....	U. P.	January to December.
A. G. Burns, Observer, U. S. Weather Bureau.....	Sault Ste. Marie.....	Chippewa....	U. P.	January to December.
S. E. Walt.....	Traverse City.....	G'd Traverse	N. W.	January to December.
F. H. Duff, Observer, U. S. Weather Bureau.....	Alpena.....	Alpena.....	N. E.	January to December.
D. W. Mitchell, M. D.....	Harrisville.....	Alcona.....	N. E.	January to December.
W. H. Fallon, Observer, U. S. Weather Bureau.....	Grand Haven.....	Ottawa.....	W.	January to December.
Wm. J. Olds, M. D., Observer, U. S. Weather Bureau.....	Port Huron.....	St. Clair.....	B. & E.	January to June.
J. W. Cronk, Observer, U. S. Weather Bureau.....	Port Huron.....	St. Clair.....	B. & E.	July to December.
John S. Caulkins, M. D.....	Thornville.....	Lapeer.....	B. & E.	January to December.
Prof. R. C. Kedzie.....	Agricultural College	Ingham.....	C.	January to December.
William M. Force, Asaph Hall, Jr., Director Detroit Observatory.....	Office State B'd of Health, Lansing }	Ingham.....	C.	January to December.
	Ann Arbor.....	Washtenaw..	S. C.	January to December.
J. H. Kellogg, M. D.....	Battle Creek.....	Calhoun.....	S. C.	January to December.
C. C. Tefft.....	Tecumseh.....	Lenawee.....	S. C.	January to December.
B. S. Pague, Local Forecast Official U. S. W. Bureau.....	Detroit.....	Wayne.....	S. E.	January and February.
Norman B. Conger, Inspector, U. S. Weather Bureau.....	Detroit.....	Wayne.....	S. E.	March to December.

*The counties in each division are stated in Exhibit I, in the annual report for 1898 and preceding reports.

The article in this annual report relative to "Causes of Diseases," based upon weekly reports of sickness in Michigan, may well be studied in connection with this article, the main purpose of which is to serve as a basis for studies of the causes of diseases.

It is believed that there is nowhere else so complete a statement of the facts relating to meteorology of Michigan as is here presented, for any use for which such knowledge may be needed, now or hereafter.

TABLE II.—*Latitude and longitude, elevation above sea level, and the average temperature and average barometric pressure in 1901, at meteorological stations in Michigan,—the names of the stations being arranged in order by latitude, highest first.*

Localities in order of latitude, those farthest North, first.	Latitude North.	Longitude West from Greenwich.	Altitude (approximate) above sea level.—Feet.	Height of mercury in cistern of barometer above sea level.—Feet.	Average temperature 1901. Degrees Fahr.	Average atmospheric pressure 1901. Inches of mercury corrected for temp.
Marquette	46°34'	87°24'	669.	-----	-----	-----
Sault Ste. Marie	46°30'	84°21'	607.	-----	-----	-----
Alpena	45°5'	83°3'	587.	-----	-----	-----
Traverse City	44°45'	85°40'	598.	605.	46.49	29.325
Harrisville	43°40'	83°30'	616.	-----	44.21	29.322
Grand Haven	43°5'	86°18'	590.	-----	-----	-----
Port Huron	43°0'	82°28'	602.	-----	-----	-----
Thornville	* 42°55'	* 83°10'	† 975.	† 980.	48.85	28.952
Agricultural College	42°44'	84°29'	820.	834.	48.25	29.086
Lansing, S. B. of H.	‡ 42°44'	‡ 84°33'	§ 900.	917.	48.50	29.083
Detroit	42°20'	83°3'	585.	-----	-----	-----
Battle Creek	42°20'	85°11'	800.	-----	51.00	29.333
Ann Arbor	42°17'	83°44'	930.	936.	49.05	29.044
Tecumseh	* 42°1'	* 83°57'	835.	840.	-----	-----

*Estimated from lines on a map of Michigan, issued by the General Land Office, Department of the Interior, 1878. For stations having no reference mark, the latitude and longitude were stated by the observer on the meteorological reports received.

†Estimated from data in Tackabury's Atlas of the State of Michigan.

‡The exact latitude and longitude of the astronomical post placed in the ground near the new Capitol at Lansing, by the U. S. Lake Survey in 1875, as determined by the observations then made, is 42° 43' 53.11" N and 84° 33' 19.68" W.

§Estimated from comparisons of the barometrical observations at Lansing, Port Huron, and Grand Haven for the four years, 1879-82.

NOTE.—Green's standard barometer was used at the above stations for the year 1901.

TABLE III.—*Average temperature by year and months, for the year 1901, and the average for the 24 years, 1877-1900. These averages are for groups of several stations in Michigan.*

Years, etc.	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
{ Av. for 24 yrs., 1877-1900. }	46.50	21.89	23.02	29.81	45.06	56.47	66.58	70.96	68.55	61.70	49.83	36.35	27.83
1901	46.72	24.11	16.66	31.81	46.34	55.28	67.96	75.31	70.00	62.48	51.20	35.09	24.36

4 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE IV.—Average temperature by year and months, for the year 1901 and the average for the 22 years, 1879-1900, at the office of the State Board of Health, State Capitol, Lansing, Michigan.

Years, etc.	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
{ Av. for 22 yrs., } 1879-1900.....	47.49	22.77	23.67	31.21	46.70	58.34	68.25	72.07	69.11	62.01	50.41	36.89	28.39
1901.....	47.08	24.45	16.06	32.08	47.37	56.45	69.57	76.00	69.53	62.02	51.38	35.40	24.67

TABLE V.—Average temperature by year and months, for the year 1901, and the average for the 37 years, 1864-1900, at the Agricultural College, Michigan.

Years, etc.	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
{ Av. for 37 yrs., } 1864-1900.....	46.69	22.10	23.38	30.83	46.18	58.08	67.87	71.40	69.00	60.75	48.64	35.62	26.63
1901.....	46.90	23.45	14.38	32.49	47.78	57.42	69.04	76.32	69.29	62.67	51.13	34.53	24.25

Meteorological characteristics of the year 1901 in Michigan.—At the several meteorological stations, in different parts of the State, the average temperature for 1901 was .22° higher than the average for the preceding twenty-four years; the annual range of temperature was 1° higher than in 1900, and the same as the annual range for the preceding twenty-four years; the average monthly range of temperature was 1° less than in 1900, and 5° less than the average for the preceding twenty-four years. The daily range of temperature was .87° less than in 1900, and .70° less than the average for the preceding twenty-two years. The average cloudiness was three per cent greater than in 1900, and one per cent greater than the average for the preceding twenty-four years; the rainfall (rain and melted snow) was .96 of an inch less than in 1900, and 4.81 inches less than the average for the preceding twenty-four years; the average atmospheric pressure was .020 of an inch less than in 1900, and .001 of an inch greater than the average for the preceding twenty-four years.

In Table VI, is given by year and months, a comparison of conditions in 1901, in Michigan, with those in 1900, and with the averages of periods of years. Naming the months in order of greatest difference, July, January, March, August, June, October, April and September were months in which the average temperature in 1901 was higher than the average for corresponding months in the preceding twenty-three years; February, December, November and May were months in which the average temperature in 1901 was lower than the average for corresponding months in the preceding twenty-four years.

TABLE VI.—*Statements of meteorological conditions in the year, and in each month of the year 1901, compared with the annual and monthly averages for 1900, and for several stated periods of years. These statements and averages are for groups of several stations in Michigan.*

Meteorological conditions.	1901 Compared with averages for previous years.		In 1901 more (+), or less (—), than in 1900.	Meteorological conditions.	1901 Compared with averages for previous years.		In 1901 more (+), or less (—), than in 1900.
	No. of years aver- aged, end'g with 1900.	More (+), or less (—), in 1901 than the aver- age for pre- vious years			No. of years aver- aged, end'g with 1900.	More (+), or less (—), in 1901 than the aver- age for pre- vious years	
YEAR 1901.				YEAR 1901.			
Av. temp.....	24	+ .22°	—1.47°	<i>Continued.</i>			
Range of temp.*....	24	=	+1°	Cloudiness.....	24	+1 per ct.	+3 per ct.
Av. monthly range of temp.*.....	24	—5°	—1°	Rainfall.....	24	—4.81 in.	— .96 in.
Av. daily range of temp.*.....	22	— .70°	— .87°	Atmospheric pres- sure.....	24	+ .001 in.	— .020 in.
JANUARY.				FEBRUARY.			
Av. temp.....	24	+2.22°	—2.72°	Av. temp.....	24	—6.36°	—2.72°
Range of temp.*....	24	—3°	+3°	Range of temp.*....	24	—25°	—32°
Av. daily range of temp.*.....	22	—1.30°	— .43°	Av. daily range of temp.*.....	22	— .50°	—1.40°
Cloudiness.....	24	+4 per ct.	—3 per ct.	Cloudiness.....	24	—5 per ct.	—4 per ct.
Rainfall.....	24	— .57 in.	+ .31 in.	Rainfall.....	24	—1.01 in.	—1.61 in.
Atmospheric pres- sure.....	24	— .036 in.	+ .003 in.	Atmospheric pres- sure.....	24	— .011 in.	+ .052 in.
MARCH.				APRIL.			
Av. temp.....	24	+2.00°	+6.70°	Av. temp.....	24	+1.28°	— .61°
Range of temp.*....	24	+10°	+27°	Range of temp.*....	24	—9°	=
Av. daily range of temp.*.....	22	—1.53°	—2.24°	Av. daily range of temp.*.....	22	—1.12°	—1.12°
Cloudiness.....	24	+10 per ct.	+13 per ct.	Cloudiness.....	24	=	+9 per ct.
Rainfall.....	24	+ .43 in.	+ .76 in.	Rainfall.....	24	— .79 in.	— .02 in.
Atmospheric pres- sure.....	24	— .149 in.	— .189 in.	Atmospheric pres- sure.....	24	+ .114 in.	+ .050 in.
MAY.				JUNE.			
Av. temp.....	24	—1.19°	—3.67°	Av. temp.....	24	+1.38°	+1.03°
Range of temp.*....	24	—12°	—14°	Range of temp.*....	24	+2°	+1°
Av. daily range of temp.*.....	22	—1.67°	—2.68°	Av. daily range of temp.*.....	22	— .60°	—1.12°
Cloudiness.....	24	+9 per ct.	+6 per ct.	Cloudiness.....	24	—5 per ct.	+6 per ct.
Rainfall.....	24	— .82 in.	— .31 in.	Rainfall.....	24	—1.12 in.	— .06 in.
Atmospheric pres- sure.....	24	— .049 in.	— .075 in.	Atmospheric pres- sure.....	24	+ .018 in.	— .011 in.

*By registering thermometers.
Comments on Table VI are printed on page 4.
The low temperature for February and the small amount of rainfall for the year 1901 are especially noticeable.

6 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE VI.—CONTINUED.—*Meteorological conditions at stations in Michigan, in months, for the year 1901, compared with averages for corresponding months in preceding years.*

Meteorological conditions.	1901 Compared with averages for previous years.		In 1901 more (+), or less (—), than in 1900.	Meteorological conditions.	1901 Compared with averages for previous years.		In 1901 more (+), or less (—), than in 1900.
	No. of years aver- aged, end'g with 1900.	More (+), or less (—), in 1901 than the aver- age for pre- vious years			No. of years aver- aged, end'g with 1900.	More (+), or less (—), in 1901 than the aver- age for pre- vious years	
JULY.				AUGUST.			
Av. temp.....	24	+4.35°	+3.78°	Av. temp.....	24	+1.45°	-4.40°
Range of temp.*....	24	+4°	+5°	Range of temp.*....	24	-10°	-7°
Av. daily range of temp.*.....	22	-.60°	+.35°	Av. daily range of temp.*.....	22	-1.71°	-1.57°
Cloudiness.....	24	-2 per ct.	-6 per ct.	Cloudiness.....	24	+6 per ct.	+7 per ct.
Rainfall.....	24	+1.28 in.	+.11 in.	Rainfall.....	24	-.21 in.	-.48 in.
Atmospheric pres- sure.....	24	+.009 in.	-.001 in.	Atmospheric Pres- sure.....	24	+.038 in.	-.010 in.
SEPTEMBER.				OCTOBER.			
Av. temp.*.....	24	+.78°	-3.22°	Av. temp.....	24	+1.37°	-6.53°
Range of temp.*....	24	-6°	+1°	Range of temp.*....	24	-6°	-5°
Av. daily range of temp.*.....	22	-1.12°	-1.24°	Av. daily range of temp.*.....	22	+2.77°	-.08°
Cloudiness.....	24	=	+1 per ct.	Cloudiness.....	24	-15 per ct.	-4 per ct.
Rainfall.....	24	-.65 in.	-.22 in.	Rainfall.....	24	+.16 in.	+.72 in.
Atmospheric pres- sure.....	24	+.027 in.	-.002 in.	Atmospheric pres- sure.....	24	+.039 in.	-.055 in.
NOVEMBER.				DECEMBER.			
Av. temp.....	24	-1.26°	-1.27°	Av. temp.....	24	-3.47°	-4.01°
Range of temp.*....	24	-11°	-3°	Range of temp.*....	24	=	+8°
Av. daily range of temp.*.....	22	-.81°	+.24°	Av. daily range of temp.*.....	22	-.21°	+.72°
Cloudiness.....	24	+2 per ct.	+3 per ct.	Cloudiness.....	24	-6 per ct.	-3 per ct.
Rainfall.....	24	-1.59 in.	-1.92 in.	Rainfall.....	24	+.04 in.	+1.75 in.
Atmospheric pres- sure.....	24	+.036 in.	+.035 in.	Atmospheric pres- sure.....	24	-.030 in.	-.040 in.

*By registering thermometers.

Representative data.—Whoever will carefully study Diagram I, in this article, and in similar articles for preceding years, will see that thermometers and methods of observation have become so perfect that, given a curve representing correctly the temperature by months at one station in Michigan, curves can readily be constructed without actual records, which will somewhat closely represent the temperature at each of several other stations, because the curves for many stations run so nearly parallel that all that is necessary to do is to find the average difference of mean annual temperature at the station to be represented compared with the station for which the data are given. It may also be seen that a curve representing the temperature at a station in the central part of the State very closely resembles the curve representing the average for many stations representing nearly all parts of the State. This proves that the practice adopted many years ago of using statements of some of the meteorological characteristics at one central station is a reasonably safe practice, and it is especially useful when it enables us to gain a comparison for a longer period than can be made from records at many stations, and also when employed in advance of the receipt of records from all stations, as is the case when the weekly bulletins of "Health in Michigan" are issued, for the purposes for which the meteorological conditions at the State Capitol are used to represent the conditions probably prevailing throughout the State.

That a curve exhibiting the results of the observations of *one* skillful observer, in the central part of the State, using an instrument of precision (a standard thermometer costing about three dollars), is substantially like a curve for the average of other localities, is a fact of very great importance in statistics; proving, as it does, that when great care is taken to ensure accuracy of observation, representative data are reasonably accurate and reliable; even the data collected by one observer may represent an entire State with sufficient accuracy for most practical purposes.

LOCAL METEOROLOGICAL PHENOMENA IN THE SEVERAL MONTHS OF THE YEAR 1901.

The following general remarks relative to temperature, frosts, effects on vegetation, migration of birds, etc., in 1901, are taken from the monthly reports by observers. The names of stations are appended; the names of observers are stated in Table I:

JANUARY.

Jan. 8. Snow all melted. Jan. 20, did not freeze at night. January was a rough, stormy month, plenty of snow but no sleighing. The ice on lakes is about 18 inches thick. The temperature was about normal. The month was notable for great latitude in barometric pressure.—*Thornville*.

Depth of snow on ground Jan. 15, 3 inches. Jan. 31, 3 inches. Ground frozen, Jan. 1 to 31 inclusive. First sleighing of season Jan. 11, 12, 13, 14, 15, 16, 17, 18, 19, 27, 28, 29, 30, 31. White frost, Jan. 22.—*Lansing*.

Total snowfall, 12.6 inches.—*Detroit*.

FEBRUARY.

The driest February on record.—*Alpena*.

Trees covered with rime, Feb. 14. February was a cold, windy, stormy month with snow enough but poor sleighing—roads badly drifted. Ice on ponds 18 inches nearly, in the earth 10 inches and up.—*Thornville*.

Total snowfall, 16.4 inches; on ground Feb. 28, 7.7 inches.—*Detroit*.

Ground frozen Feb. 1 to 28 inclusive. Sleighing Feb. 1 to 28 inclusive. Depth of snow on ground Feb. 15, 10 inches; Feb. 28, 10 inches.—*Lansing*.

Heavy Frost, Feb. 8.—*Ann Arbor*.

8 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

MARCH.

Killing frost, Mar. 27.—*Port Huron*.
Melting snow, Mar. 2, 3. Ice storm turning to rain, Mar. 10. Ice storm Mar. 18. First robin seen, Mar. 16. First bluebird, Mar. 17. Killdeer plover, Mar. 20. Did not freeze at night, Mar. 23, 24; snow all gone in the open. March was a wintry month, and as it closes there is still frost in the ground. There was considerable sleighing. Wheat shows up very poorly. There is no prospect of a better crop than the last. Rye is better. It is Hessian fly that has ruined the wheat; the insect does not seem to attack the rye to any extent.—*Thornville*.
Sleighing, March 1, 2, 3. (Poor) March 4, 5, 6, 7, 8, 9, 10, 11, 12. Ground frozen, Mar. 1 to 22, 28, 29, 30, 31. Robins appeared, Mar. 16, crows Mar. 17, bluebirds and blackbirds, Mar. 18, killdeer, Mar. 19. Ice moving in Grand River, Mar. 17. Grand River open Mar. 26. Frost out of ground, Mar. 26. Frogs heard, Mar. 25. Depth of snow on ground, Mar. 15, 3 inches.—*Lansing*.

APRIL.

White frost, Apr. 9, 10. First boat through rotten ice, Apr. 15.—*Traverse City*.
Light frosts, Apr. 2, 4, 5, 11, 12, 16. Heavy frost, Apr. 27.—*Port Huron*.
First honey bees seen, Apr. 4. Meadow-lark seen and frogs heard, Apr. 14. Apple trees leafing, Apr. 27. Apricot trees in blossom, Apr. 30. April was a dry month not favorable to growth of vegetation, the nights having been cold. Wheat is very poor, no better than last year. Grass grows slowly and the season generally seems rather backward.—*Thornville*.
Light frosts, Apr. 4, 16, 25. Heavy frosts, Apr. 5, 27. Killing frost, Apr. 1.—*Detroit*.
Ground froze, Apr. 1, 4, 9, 10, 11, 19, 20. Killing frosts, Apr. 1, 4, 5, 9, 10, 11, 19, 20. Light frost, Apr. 26. Phoebe-bird heard Apr. 15. Canitol lawn mowed, first time of season, Apr. 24. First dandelion blossom seen, Apr. 27.—*Lansing*.

MAY.

Heavy frost, May 15.—*Marquette*.
Light frost, May 26. Heavy frosts, May 3, 14, 15. Killing frost, May 4.—*Sault Ste. Marie*.
Light frosts, May 3, 14, 16, 26. Heavy frost, May 4. Killing frost, May 15.—*Alpena*.
Light frosts, May 13, 15. Heavy frosts May 3, 4.—*Port Huron*.
Frosts, May 2, 3, 26. Cherries, plums and pears blossom, May 6. Peaches blossom, May 8. Apples blossom, May 9. Rye in head, May 18.—*Oriole* returned May 1. Cuckoo and bobolink, May 22.—*Thornville*.
Light frosts, May 4, 13, 15.—*Detroit*.
Bobolinks appeared, May 1. Light frosts, May 4, 13, 15, 30. Peaches, plums and pears in bloom, May 3. Cherry in bloom, May 4.—*Lansing*.

JUNE.

Heavy frost, June 9.—*Marquette*.
Heavy frost, June 9.—*Sault Ste. Marie*.
Frost, June 8. Hall storm, June 12.—*Traverse City*.
Light frost, June 1, 3.—*Port Huron*.
Light frost, June 1, 3. June was a month of average temperature, sufficient rainfall, and favorable conditions generally for work and growth. Work is behind hand on account of the great amount of wheat that had to be plowed up.—*Thornville*.
Severe thunder storm, with high wind and hail, June 28.—*Ann Arbor*.
Light frost in places, June 3, injured tender vegetation some.—*Lansing*.

JULY.

July was a hot, dry month—a big rain, 4.25, then only light showers, that dried up with the first sun, till the 25th, which partly broke the drought. As the month closes rye is cut; oats partly. Corn is growing finely. Potatoes, beans and buckwheat need more rain which they will probably get and make good crops. Hay was a big crop: wheat nothing.—*Thornville*.
Ten days with maximum temperature 90° or above, highest mean temperature in 30 years, and greatest monthly rainfall since 1880.—*Detroit*.
Temperature by hours: July 1, 7 A. M., 81 degrees; 8 A. M., 85 degrees; 9 A. M., 87 degrees; 10 A. M., 90 degrees; 11 A. M., 91 degrees; 12 M., 92½ degrees; 1 P. M., 93 degrees; 2 P. M., 94 degrees; 3 P. M., 95 degrees; 4 P. M., 92 degrees.—*Lansing*.

AUGUST.

The drought lasted till the 19th, having become very pinching toward the last. The heavy rains were the salvation of everything unripened except beans, most of which were too advanced to be helped much. The benefit to pastures and plowing were equally great. No wheat this year. Grass crop was immense. No fruit this year except peaches and grapes.—*Thornville*.

SEPTEMBER.

Light frosts, Sept. 9, 30. Heavy frost, Sept. 19.—*Marquette*.
Heavy frost, Sept. 19.—*Alpena*.
Light frost, Sept. 18. Heavy frost, Sept. 19, 21.—*Port Huron*.
Light frost, first of season, Sept. 19. The month was very favorable for farm work, clear and pleasant; not very warm, and moist enough for growth of seedling to grain. Owing to the scarcity of labor this has been a great thing for the farmers, and work has been rushed along remarkably. There remains yet the potatoes to dig and corn to husk. Very little wheat sown this fall: mostly all rye. The Hessian fly has stopped wheat raising for the present in this section of the country. No apples this year.—*Thornville*.
Light frosts, Sept. 18, 19, 21.—*Detroit*.
Light frost, first of season, Sept. 19.—*Lansing*.

OCTOBER.

Light frost, Oct. 3. Heavy frost, Oct. 6. Killing frost, Oct. 4.—*Marquette*.
 Killing frost, Oct. 3.—*Sault Ste. Marie*.
 Frosts, Oct. 24, 27.—*Traverse City*.
 Heavy frost, Oct. 3. Killing frost, Oct. 4.—*Port Huron*.
 First snowflakes flying, Oct. 17. On account of its fine, pleasant weather, October was an ideal month for work on the farm, but too dry toward the last for growth. As the month closes the work is about all done except husking and that has a good start. No wheat to speak of has been sowed—all rye.—*Thornville*.
 Heavy frost, Oct. 3. Killing frost, Oct. 18.—*Detroit*.
 Light frosts, Oct. 4, 7, 14, 26. Killing frosts, Oct. 3, 5, 6, 17, 18, 20, 25, 28. Snow flurries, first of season, Oct. 17. Ground froze, first time of season, Oct. 18, 20, 21, 25, 28. Ice formed, Oct. 18, 20.—*Lansing*.

NOVEMBER.

First snowflakes flying, Nov. 4. First snow to whiten ground, Nov. 13.—*Thornville*.
 Ground froze, Nov. 4, 5, 6, 8, 10. Ice formed, Nov. 4, 5, 6, 8. Ground covered with snow, first time of season, Nov. 5. Grand River frozen over in places, first of season, Nov. 28.—*Lansing*.

DECEMBER.

Very warm for the season, Dec. 1. A very fair winter month excepting the cold temperature. No good sleighing although plenty of snow. At close of month the ground is quite well covered with about five inches of snow—enough to protect winter crops. Not much frost in the ground. Trees covered with rime, morning of Dec. 30.—*Thornville*.
 Indian summer, Dec. 1, 6. Dandelions in bloom, Dec. 1. Grand River closed, Dec. 5: open, Dec. 13. Skating on Grand River, first of season, Dec. 7. Grand River closed, second time of season, Dec. 15. Trees covered with white frost, Dec. 30, in morning. Depth of snow on ground, Dec. 16, 1½ inches; Dec. 31, 3 inches.—*Lansing*.
 Depth of snow on ground. Dec. 15. 0.7 in.; Dec. 31. 2.2 in.—*Detroit*.

TABLE VII.—Depth of wells; depth of ground above water in well; temperature of water in well, and day of observation of such temperature, in each month of the year 1901, as reported by meteorological observers for the State Board of Health, and for the United States Weather Bureau. (The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.)

Stations in Michigan.	January.			February.			March.			April.			May.			June.		
	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.
Traverse City*.....	55	40 2	47 ²²	55	40 6	46 ²²	55	40 6	47 ¹⁸	55	39 11	48 ²⁴	55	39 8	47 ²¹	55	39 8	47 ²⁹
Lansing S. B. of H.....	26 11½	26 7	52 ¹⁷	+	.....	.....	26 11½	26 5½	50 ¹⁶	26 11½	26 7	50 ¹⁵	26 11½	26 5	51 ¹⁶	26 11½	26 3	51 ¹⁹
Ann Arbor.....	17	13 9	46 ¹⁷	17	14	42 ¹⁸	17	13 6	46 ¹⁷	17	12 6	47 ¹⁴	14 10	10 7	48 ²¹	14 10	10 10½	49 ¹⁶
Stations in Michigan.	July.			August.			September.			October.			November.			December.		
	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.	Depth of well. —Ft., in.	Depth of ground above water in well. —Ft., in.	Temp. of water in well—Deg. Fahr.
Traverse City*.....	55	39 9	52 ²²	55	39 6	47 ¹⁷	55	40 6	47 ²⁷	55	40 1	48 ²⁹	55	40 2	48 ²⁰	55	40 6	48 ²³
Lansing, S. B. of H.....	26 11½	26 2	51 ¹⁶	26 11½	26 3½	52 ¹⁶	26 11½	26 2	52 ¹⁶	26 11½	26 1¼	53 ¹⁶	26 11½	26 4½	50 ¹⁵	26 11½	26 2½	52 ¹⁶
Ann Arbor.....	14 10	10 10	52 ¹⁵	14 10	10 10	54 ¹⁹	14 10	11 6	57 ¹⁵	14 10	11 11	54 ¹⁸	14 10	12 3	49 ¹⁶	14 10	12 1	42 ¹⁸

*At Northern Michigan Asylum, Alfred Newman, observer.

†Well dry.

Note.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.

Temperature of the atmosphere.—The average temperature by months, for the twenty-two years, 1879-1900, at Lansing, and a comparison of 1901, by months, with that average, are stated in Table XI.

The average temperatures at each of eight stations in Michigan, and the average for the eight stations in 1901, and in each month of that year, are stated in Table IX.

TABLE VIII.—Average temperature by year and months in 1901, compared with annual and monthly averages for 1900, and for the 24 years, 1877-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Average temperature.—Degrees Fahr.											
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov. Dec.
Av. 24 yrs., 1877-1900	46.50	21.89	23.02	29.81	45.06	56.47	66.58	70.96	68.55	61.70	49.83	36.35 27.83
Av. 22 yrs., 1879-1900	46.28	21.78	22.29	29.46	44.66	56.47	66.60	70.73	68.35	61.50	49.68	36.20 27.65
1900 (9 stations)....	48.19	25.83	19.38	25.11	46.95	58.95	66.93	71.53	74.40	65.70	57.73	36.36 28.37
1901 (8 stations)....	46.72	24.11	16.66	31.81	46.34	55.28	67.96	75.31	70.00	62.48	51.20	35.09 24.36
In 1901 higher than av. for 24 years, 1877-1900.....	.22	2.22		2.00	1.28		1.38	4.35	1.45	.78	1.37	
In 1901 lower than av. for 24 years, 1877-1900.....			6.36			1.19						1.26 3.47
In 1901 higher than in 1900.....				6.70			1.03	3.78				
In 1901 lower than in 1900.....	1.47	2.72	2.72		.61	3.67			4.40	3.22	6.53	1.27 4.01

*At from 9 to 22 stations per year for the 24 years, 1877-1900. Just which stations in each year, up to 1897, are shown on page 17, report for 1898.

NOTE.—Beginning with the year 1885, allowance must be made for Lansing in Table VIII, because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, report for 1886.

The average annual and monthly temperatures at from 9 to 22 stations for a period of twenty-four years, 1877-1900, are stated in Table VIII, in which is also given, by months, a comparison of 1901 with the average for 1900, and with the averages for the twenty-four years, 1877-1900. By Table VIII, which gives averages for groups of several stations in Michigan, it appears that in 1901 the mean temperature in February, May, November and December was lower than in those months in 1900. It also appears that January, March, April, June, July, August, September and October were warmer than the average temperature for the corresponding months for the twenty-four years, 1877-1900.

12 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE IX.—Average temperature in degrees Fahr., for the year, and by months of the year 1901, at each of 8 stations in Michigan, and also an average line for the 8 stations. From observations made daily at 7 A. M., 2 P. M., and 9 P. M., local time, by observers* for the State Board of Health.

Stations in Michigan.*	Divi- sions of the State. †	Temperature in degrees Fahr.													
		Year.		Months, ‡ 1901.											
		Norm. §	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average 8 stations|			46.72	24.11	16.66	31.81	46.34	55.28	67.96	75.31	70.00	62.48	51.20	35.09	24.36
Traverse City.....	N. W.	19 44.64	45.25	23.32	19.38	28.49	44.43	51.27	63.09	72.85	68.92	60.32	50.77	35.46	24.68
Harrisville.....	N. E.	13 43.08	42.72	20.38	15.39	25.51	41.70	49.46	60.82	69.26	65.95	59.82	48.29	33.28	22.75
Thornville.....	B. & E.	25 47.97	47.17	23.66	15.98	31.87	46.33	56.53	69.72	76.06	70.49	64.49	51.47	34.37	25.02
Agr'l College.....	C.	38 46.70	46.90	23.45	14.38	32.49	47.78	57.42	69.04	76.32	69.29	62.67	51.13	34.53	24.25
Lansing, S. B. of H.*	C.	23 47.47	47.08	24.45	16.06	32.08	47.37	56.45	69.57	76.00	69.53	62.02	51.38	35.40	24.67
Ann Arbor.....	S. C.	21 47.28	47.43	24.60	16.40	32.90	47.10	57.00	70.20	76.60	71.20	62.70	51.50	35.00	24.00
Battle Creek.....	S. C.	2 50.37	49.74	27.58	19.82	37.84	49.13	57.65	71.84	78.92	72.72	64.90	54.10	37.19	25.17
Tecumseh.....	S. C.		47.45	25.41	15.83	33.28	46.91	56.49	69.39	76.44	71.90	62.92	50.97	35.52	24.33

*The names of observers, their place of observation, and the counties in which these places are situated, are stated in Table I.

†The names of divisions, and the counties in each, are stated in Exhibit I, in the annual report for 1898 and preceding reports.

‡The computations for average temperature, as tabulated for months in 1901, were made at the following stations: Ann Arbor and the Agricultural College. All other computations in Table IX were made at the office of the State Board of Health.

§Numbers in this column state the average annual temperature for periods of years ending in each case with December 31, 1901. The small figures above and at the right of numbers which state the temperature, denote the number of years included in the average.

||This line is an average for the eight stations from which statements nearly complete were received for every month of the year.

¶Beginning with the year 1885, allowance must be made for Lansing in Table IX, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, report for 1886.

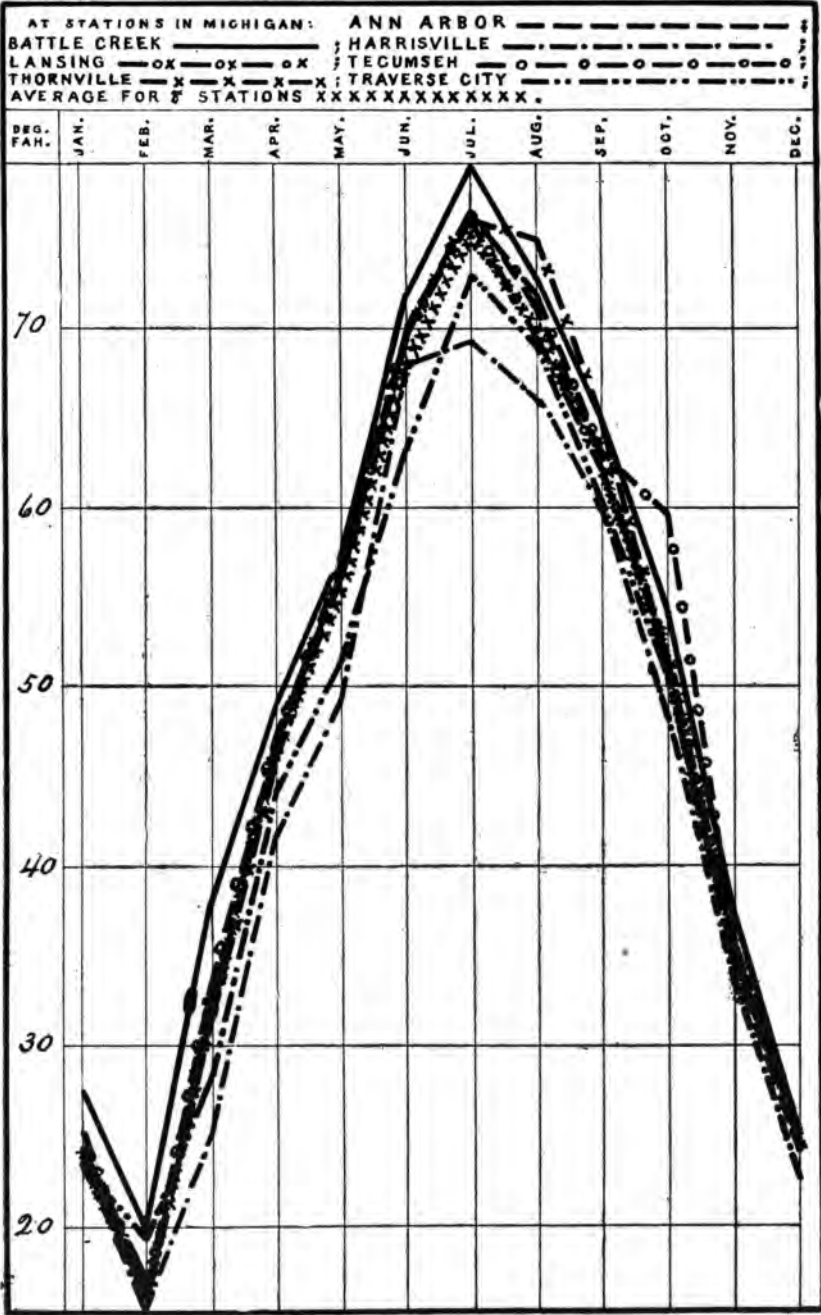
a, b, c. In the columns from January to December, inclusive, the letters a, b, c., etc., stand directly above the numbers from which they refer to the notes below.

a For 29 days. b For 28 days. c For 23 days. d For 21 days. e For 19 days. f For 17 days.

The average line and lines for seven representative stations in Table IX are graphically represented in Diagram I.

The average daily range of temperature at from 6 to 19 stations per year, by months, for a period of twenty-two years, 1879-1900, and a comparison of 1901 with the monthly averages for that period and for 1900, are given in Table XIII. The highest and lowest temperatures in every month in 1901, at each of twelve stations, are stated in Table XIV. The average daily range of temperature by months in 1901, at each of fourteen stations, and the average for the fourteen stations, are stated in Table XV. The lines for each of twelve of these stations, and the average line for the fourteen stations, are represented in Diagram II. It will be noticed that the greatest average daily range of the fourteen stations occurred during the months of June, July and October; but there were wide differences in the several stations.

DIAGRAM I.- AVERAGE TEMPERATURE BY MONTHS, 1901.



14 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE X.—*Comparison of the average temperature during the year and during each month of the year 1901, with the annual and with the monthly averages for the year 1900, and with the averages for the 37 years, 1864-1900. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

Years, etc.	Average temperature.—Degrees Fahr.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 37 yrs., 1864-1900	46.69	22.10	23.38	30.83	46.18	58.08	67.87	71.40	69.00	60.75	48.64	35.62	26.63
1900.....	48.25	26.39	19.83	24.89	48.43	60.01	67.59	70.73	74.05	65.31	57.12	35.94	29.69
1901.....	46.90	23.45	14.38	32.49	47.78	57.42	69.04	76.32	69.29	62.67	51.13	34.53	24.25
In 1901 higher than av. for 37 years, 1864-1900.....	.21	1.35	-----	1.66	1.60	-----	1.17	4.92	.29	1.92	2.49	-----	-----
In 1901 lower than av. for 37 years, 1864-1900.....	-----	-----	9.00	-----	-----	.66	-----	-----	-----	-----	-----	1.09	2.38
In 1901 higher than in 1900.....	-----	-----	-----	7.60	-----	-----	1.45	5.59	-----	-----	-----	-----	-----
In 1901 lower than in 1900.....	1.35	2.94	4.45	-----	.65	2.59	-----	-----	4.76	2.64	5.99	1.41	5.44

TABLE XI.—*Average temperature by year and months in 1901* compared with annual and monthly averages for 1900, and for the 22 years, 1879-1900. Observations made at office State Board of Health, State Capitol, Lansing, Mich.*

Years, etc.	Average temperature.—Degrees Fahr.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 22 yrs., 1879-1900	47.49	22.77	23.67	31.21	46.70	58.34	68.25	72.07	69.11	62.01	50.41	36.89	28.39
1900.....	48.50	27.12	20.36	25.47	48.07	60.18	67.11	71.05	74.31	65.00	57.71	37.02	28.62
1901.....	47.08	24.45	16.06	32.08	47.37	56.45	69.57	76.00	69.53	62.02	51.38	35.40	24.67
In 1901 higher than av. for 22 years, 1879-1900.....		1.68		.87	.67		1.32	3.93	.42	.01	.97		
In 1901 lower than av. for 22 years, 1879-1900.....	.41		7.61			1.89						1.49	3.72
In 1901 higher than in 1900.....				6.61			2.46	4.95					
In 1901 lower than in 1900.....	1.42	2.67	4.30		.70	3.73			4.78	2.98	6.33	1.62	3.95

*Beginning with the year 1885, slight allowance should be made for Lansing in Exhibit 10, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, report for 1886.

METEOROLOGICAL CONDITIONS IN MICHIGAN IN 1901. 15

TABLE XII.—Average temperature in degrees Fahr., for the year and months, 1901, at office State Board of Health, State Capitol, Lansing, Michigan, computed from readings at 7 A. M., 2 P. M. and 9 P. M., daily, from registers of the Draper self-recording thermometer, compared with observations made with Green's standard mercurial thermometer at the same hours; both thermometers placed in shelter for instruments, in the southwest part of the Capitol yard.

Tri-daily readings of instruments specified.	Year.	Average temperature, in degrees Fahr.—Year and months, 1901.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. temp. from tri-daily observations with Green's standard mercurial thermometer.....	47.08	24.45	16.06	32.08	47.37	56.45	69.57	76.00	69.53	62.02	51.38	35.40	24.67
Av. temp. computed from readings of the Draper's self-recording thermometer.....	46.13	25.89	17.09	31.75	46.12	54.90	66.86	72.95	67.18	60.33	50.25	35.36	24.83
Higher by Draper's than by Green's thermometer.....		1.44	1.03										.16
Lower by Draper's than by Green's thermometer.....	.95			.33	1.25	1.55	2.71	3.05	2.35	1.69	1.13	.04	

TABLE XIII.—Average daily range of temperature, by year and months, in 1901, compared with annual and monthly averages for 1900, and for the 22 years, 1879-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Average daily range of temperature.—Degrees Fahr.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average 22 years, { 1879-1900.....	18.00	15.30	16.82	17.26	19.12	20.30	20.84	21.02	20.53	20.18	17.47	14.06	13.08
1900 (14 stations)...	18.17	14.43	17.62	17.97	19.12	21.31	21.36	20.07	20.39	20.30	20.32	13.01	12.15
1901 (14 stations)...	17.30	14.00	16.32	15.73	18.00	18.63	20.24	20.42	18.82	19.06	20.24	13.25	12.87
In 1901 greater than av. for 22 years, 1879-1900.....											2.77		
In 1901 less than av. for 22 years, 1879-1900.....	.70	1.30	.50	1.53	1.12	1.67	.60	.60	1.71	1.12		.81	.21
In 1901 greater than in 1900.....								.35				.24	.72
In 1901 less than in 1900.....	.87	.43	1.40	2.24	1.12	2.68	1.12		1.57	1.24	.08		

*At from 6 to 19 stations per year for the 22 years, 1879-1900. Just which stations in each year, up to 1897, are shown on page 21, report for 1898.

16 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XIV.—Extremes of temperature and days of month on which the highest and range for the year 1901, at each of 12 stations in Michigan, as indicated by daily P. M. and 9 P. M., by observers* for the State Board of Health, and for the United

Line number.	Stations in Michigan.* (Those of the U. S. Weather Bureau in italics.)	Year 1901.			January.		February.		March.		April.		May.	
		Highest.	Lowest.	Range.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1	At 12 stations†...	108	-18	126	54	-17	41	-12	70	-18	84	19	85	31
2	Marquette§.....	108	-9	117	40 ²⁰	-6 ¹	36 ²⁸	-1 ²²	42 ¹	-8 ⁵	80 ²⁰	27 ²⁰	74 ¹⁶	36 ¹⁴
3	Sault Ste. Marie§.....	93	-18	111	36 ¹⁰	-16 ¹⁹	33 ³	-12 ¹⁴	44 ²⁴	-18 ⁶	75 ²⁷	22 ²	78 ⁵	31 ¹⁵
4	Traverse City‡.....	99	-7	106	43 ²⁰	15 ¹⁹	35 ¹⁸	13 ¹⁴	53 ²³	-3 ⁶	83 ^{20, 30}	19 ¹⁹	77 ⁶	34 ^{2, 12}
5	Alpena§.....	98	-8	106	44 ²⁰	-8 ¹⁹	32 ¹⁸	-4 ¹⁴	44 ^{25, 26}	-5 ⁶	65 ¹⁹	23 ¹⁹	68 ²²	33 ¹⁵
6	Harrisville ‡.....	103	-17	120	45 ²⁰	-17 ¹⁸	40 ¹⁸	-5 ²²	51 ²⁶	-10 ⁵	65 ¹⁸	20 ¹⁸	70 ²²	32 ¹⁴
7	Grand Haven§.....	94	-5	99	46 ¹⁵	2 ¹⁹	31 ¹⁸	-4 ¹⁵	59 ^{23, 25}	4 ⁵	74 ^{20, 29}	26 ^{19, 20}	81 ⁵	34 ¹⁵
8	Port Huron§.....	96	-6	102	54 ²⁰	-3 ³	41 ²⁵	-6 ²³	64 ²⁵	-3 ⁶	80 ¹²	29 ¹²	82 ²	32 ⁴
9	Thornville‡.....	97	-9	106	46 ²⁰	-9 ⁸	36 ¹⁷	-7 ^{8, 9}	61 ²⁵	-5 ⁶	81 ²⁰	27 ¹	81 ²	37 ¹⁵
10	Lansing, S. B. of H.‡.....	95	-8	103	46 ²⁰	-6 ²	34 ²⁵	13 ¹⁴	68 ²⁵	-3 ⁵	82 ²⁹	25 ¹⁸	80 ²	34 ¹²
11	Ann Arbor ‡.....	97	-10	107	48 ²⁰	-7 ⁹	33 ¹⁸	-4 ¹⁴	70 ²⁵	-1 ⁶	84 ³⁰	26 ¹	85 ²	34 ¹³
12	Battle Creek‡.....	---	---	---	50 ²⁰	0 ⁹	37 ¹⁸	-5 ¹⁴	---	---	86 ²⁹	26 ¹	82 ^{1, 2, 5}	37 ^{13, 15}
13	Tecumseh‡.....	93	-10	103	48 ²⁰	-3 ⁸	37 ¹⁸	14 ¹⁵	70 ²⁵	1 ⁵	82 ³⁰	29 ^{4, 18}	82 ²	33 ¹²
14	Detroit§.....	94	-6	100	50 ²⁰	1 ¹⁹	34 ¹⁸	-1 ²³	66 ²⁵	2 ⁶	83 ³⁰	29 ¹	85 ²	36 ¹³

*The names of observers, etc., are stated in Table I.

†The line No. 1, and the three columns for the year 1901, relate only to the twelve stations from which observations were received for every month of the year. It does not include Battle Creek.

‡For stations marked thus ‡, the daily readings of registering thermometers were recorded at 7 A. M. for the preceding calendar day.

§At the stations of the U. S. Weather Bureau, the maximum thermometer was read and recorded at 8:00 A. M., and the minimum at 8:00 P. M., 75th Meridian time. The local time at these stations corresponding to 8:00 A. M. and 8:00 P. M., 75th Meridian time, is as follows: At Port Huron, 7:30 A. M. and 7:30 P. M.; at Detroit, 7:28 A. M. and 7:28 P. M.; at Alpena, 7:26 A. M. and 7:26 P. M.; at Grand Haven, 7:15 A. M. and 7:15 P. M.; at Marquette, 7:11 A. M. and 7:11 P. M.; at Sault Ste. Marie, 7:23 A. M. and 7:23 P. M.

||At Ann Arbor, the registering thermometers were read at 9 P. M.
¶Beginning with the year 1885 allowance must be made for Lansing in Table XIV, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit B, on page 22, report for 1886.

NOTE.—The small figures above and at the right of numbers denoting the degrees of temperature, state the day or days of the month on which the highest or lowest temperature occurred.

METEOROLOGICAL CONDITIONS IN MICHIGAN IN 1901. 17

the lowest temperature occurred by months of the year 1901; also, extremes and readings of registering thermometers, or by observations made daily at 7 A. M., 2 States Weather Bureau.*

June.		July.		August.		September.		October.		November.		December.		Line number.
Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	
99	34	108	47	94	44	93	33	81	22	63	7	59	-10	1
98 ²⁶	40 ⁸	108 ¹⁵	50 ⁸	84 ²³	52 ¹⁰	86 ⁴	37 ¹⁸	81 ²¹	29 ¹⁷	56 ²	18 ²³	41 ¹	-9 ¹⁶	2
93 ²⁷	37 ⁹	92 ¹⁵	47 ⁸	84 ²⁰	47 ⁵	85 ⁶	35 ¹⁹	74 ³⁰	26 ⁸	50 ³	25 ⁷	39 ¹	-4 ¹⁵	3
99 ²⁷	34 ⁸	98 ²⁰	48 ⁷	90 ²⁸	44 ⁸	88 ⁶	17, 18 ⁴⁰	76 ³⁰	28 ¹⁷	60 ¹¹	25, 26 ²¹	43 ¹	16, 20 ⁰	4
95 ²⁷	38 ⁹	98 ¹	52 ⁸	87 ¹³	48 ⁴	90 ⁶	35 ¹⁹	76 ³⁰	24 ¹⁸	58 ¹¹	12 ²⁸	44 ¹³	1 ¹⁸	5
93 ²⁷	38 ⁸	103 ¹	52 ⁵	91 ¹⁴	47 ⁴	93 ⁶	33 ¹⁸	77 ³¹	22 ¹⁷	57 ¹¹	11 ²⁷	44 ¹	-5 ²⁰	6
92 ²⁴	39 ³	17, 21 ⁹⁴	58 ³	87 ¹⁷	51 ¹¹	85 ⁶	40 ⁷	1, 29 ⁷¹	18, 20 ³⁰	62 ²	4, 27 ²⁵	50 ¹³	-5 ²¹	7
92 ²⁷	38 ¹	96 ¹	52 ⁹	89 ¹⁴	50 ¹²	90 ⁷	35 ¹⁹	77 ²³	25 ¹⁸	62 ³	16 ²⁸	55 ¹³	-5 ²¹	8
27, 30 ⁹¹	38 ³	97 ²	52 ¹³	89 ¹⁴	48 ⁵	86 ^{7, 16}	38 ¹⁹	76 ¹	18, 20, 25 ²⁸	60 ³	13 ²⁸	54 ¹	-6 ²¹	9
93 ²⁵	37 ⁷	95 ¹	50 ⁷	90 ¹⁴	10, 11 ⁴⁸	89 ⁷	33 ¹⁸	80 ¹	25 ¹⁷	59 ¹¹	12 ²⁷	58 ¹	-8 ²⁰	10
95 ²⁷	37 ¹	97 ²	51 ⁹	94 ¹⁴	49 ⁵	93 ⁷	35 ¹⁹	79 ¹	26 ¹⁸	60 ³	12 ²⁸	59 ¹	-10 ²¹	11
12, 25, 27 ⁹⁷	40 ⁸	101 ¹⁷	54 ⁸	94 ¹⁴	51 ¹⁰	94 ⁷	36 ¹⁹	83 ¹	25, 28 ³²	65 ²	18 ²⁹	60 ¹	-8 ²¹	12
12, 27, 30 ⁸⁹	39 ²	93 ²¹	50 ⁸	92 ⁹	50 ⁴	85 ⁷	35 ²⁰	77 ¹	25 ¹⁷	61 ³	27, 28 ¹⁴	57 ¹	20, 21 ⁻¹⁰	13
90 ³⁰	42 ¹	94 ¹⁰	56 ⁸	88 ¹⁵	56 ¹¹	88 ⁷	40 ¹⁹	78 ²³	28 ¹⁸	63 ³	16 ²⁸	58 ¹	-6 ²¹	14

18 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XV.—Average daily range of temperature, by registering thermometers for the year and by months of the year 1901, at each of 14 stations in Michigan, and also an average line for 14 stations.

Stations in Michigan.* (Those of the U. S. Weather Bureau in italics.)	Divisions of the State.†	Nor- mal.‡	Average daily range of temperature.—Degrees Fahr.												
			Year 1901.	Months, 1901.											
				Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 14 stat'ns§	-----	-----	17.30	14.00	16.32	15.73	18.00	18.63	20.24	20.42	18.82	19.06	20.24	13.25	12.87
<i>Marquette</i>	U. P.	14.72 ¹⁶	12.32	11.30	10.40	9.90	14.30	12.80	14.90	16.10	11.80	13.00	14.50	9.20	9.60
<i>Sault Ste. Marie</i> ...	U. P.	17.06 ¹⁰	16.53	15.40	10.90	17.90	20.70	19.90	20.60	19.00	17.60	17.60	15.00	12.10	11.70
Traverse City....	N. W.	19.60 ²⁰	17.09	14.48	17.82	17.68	16.47	19.90	21.93	20.32	17.42	16.50	19.13	12.33	11.06
<i>Alpena</i>	N. E.	15.51 ²²	15.25	13.00	16.00	15.00	15.00	17.00	18.00	17.00	16.00	17.00	17.00	11.00	11.00
Harrisville.....	N. E.	19.79 ¹⁷	18.72	19.04	22.54	18.35	15.57	17.19	19.77	20.03	19.48	18.83	21.87	16.23	15.77
<i>Grand Haven</i>	W.	15.21 ¹²	14.64	12.40	10.50	12.00	17.60	17.00	17.30	17.10	17.20	15.10	15.40	12.50	11.60
<i>Port Huron</i>	B. & E.	15.86 ²³	16.82	14.80	18.80	15.30	15.50	17.40	20.30	19.10	17.30	17.50	20.30	13.00	12.60
Thornville.....	B. & E.	21.04 ²²	15.82	9.61	14.79	11.97	17.20	18.71	18.97	19.10	18.58	21.07	19.23	10.23	10.35
Agr'l College....	C.	21.11 ²⁰	20.74	13.20	22.00	16.40	23.30	22.50	23.70	24.00	23.10	23.40	24.80	16.90	15.54
Lansing S.B. of H.	C.	19.39 ²³	19.11	14.42	17.54	16.06	20.17	19.94	21.97	22.23	21.81	21.67	23.65	15.33	14.52
Ann Arbor.....	S. C.	18.67 ²⁰	20.54	14.90	15.50	21.20	20.90	22.10	24.90	25.30	23.70	24.40	25.20	14.30	14.10
Battle Creek.....	S. C.	21.55 ²	20.39	16.23	18.42	17.33	21.00	20.13	23.03	26.23	24.03	23.43	24.10	15.07	15.68
Tecumseh.....	S. C.	-----	19.12	15.23	21.39	15.97	18.87	20.23	20.10	21.55	19.68	21.07	24.52	15.77	15.00
<i>Detroit</i>	S. E.	15.45 ²³	15.09	12.00	11.90	15.20	15.40	16.00	17.90	18.20	15.80	16.30	18.70	11.50	11.60

*The names of observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

†The counties in each division are stated in Exhibit I, in the annual report for 1898.

‡Numbers in this column state the annual average range of temperature for periods of years ending in each case with December 31, 1901. The small figures above and at the right of numbers which state the range of temperature, denote the number of years included in the average.

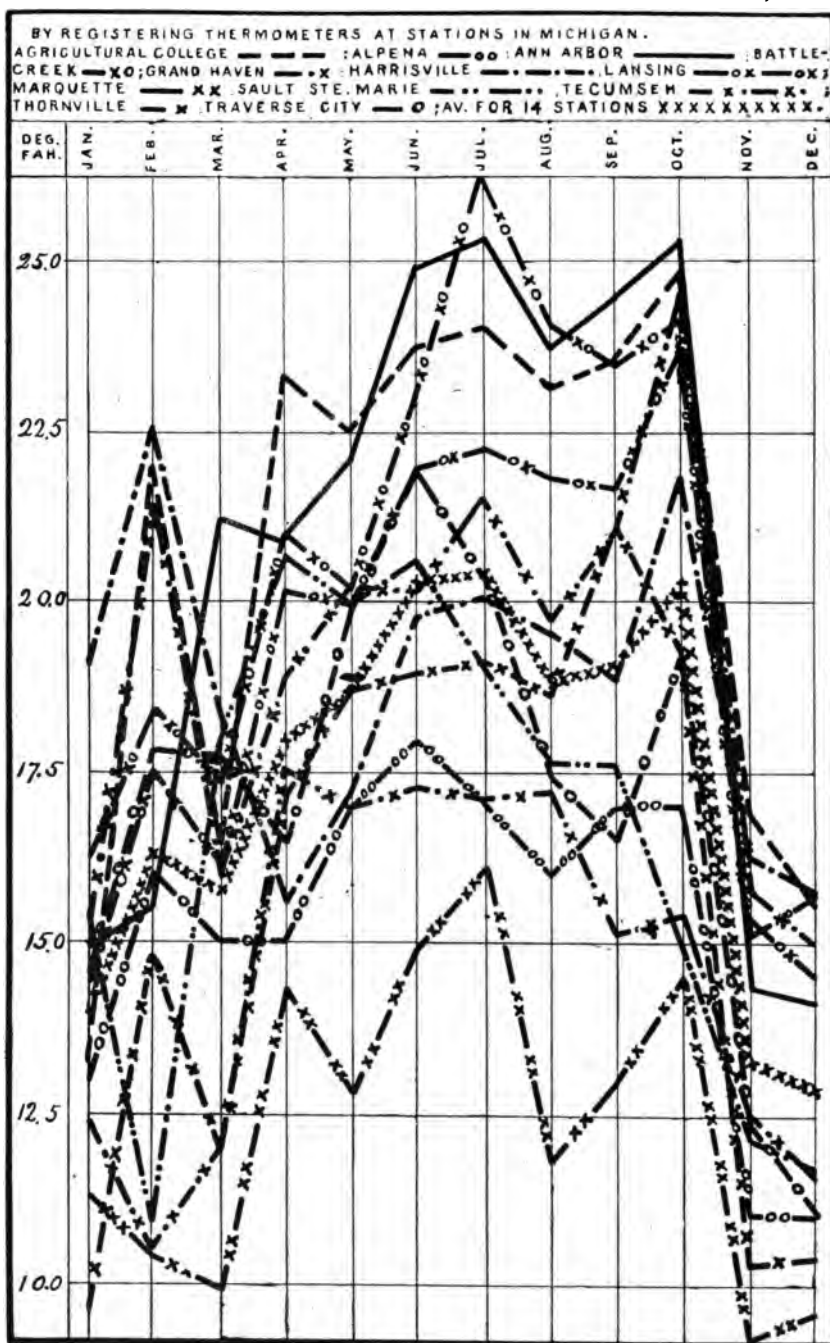
§This line is an average for all stations for which statements nearly complete are given for every month of the year.

a, b. In the columns from January to December, inclusive, the letters a and b stand directly above the numbers from which they refer to the notes below.

a For 19 days. b For 18 days.

Graphic representations of statements in Table XV are given in Diagram II.

DIAGRAM II.—AV. DAILY RANGE OF TEMPERATURE BY MONTHS, 1901.



20 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XVI.—Comparisons of the extremes and the range of temperature (degrees Fahr.) during the year, and during each month of the year 1901, with the average of the extremes, and of the range, for the 24 years, 1877-1900, also statement of the extremes and of the range for each of the seven years, 1895-1901. Observations made with registering thermometers by observers for the State Board of Health, and for the U. S. Weather Bureau. These comparisons, etc., are for groups of several stations in Michigan.

Extremes and ranges of temperature.—Degrees Fahrenheit.																											
Year and months	1895.			1896.			1897.			1898.			1899.			1900.			Av. for 24 years, 1877-1900.			1901.*			1901 higher (+) or lower (—) than av. 24 years, 1877-1900.		
	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.
Year..	100	-28	128	98	-25	123	102	-21	123	100	-18	118	104	-37	141	103	-22	125	100	-26	126	108	-18	126	+8	+8	=
Av.mo.	80	9	71	78	9	69	78	10	68	79	13	66	83	10	73	79	15	64	79	11	68	78	15	63	-1	+4	-5
Jan...	50	-12	62	45	-25	70	58	-19	77	58	-10	68	51	-28	79	54	-14	68	54	-20	74	54	-17	71	=	+3	-3
Feb...	54	-28	82	59	-22	81	46	-21	67	57	-18	75	60	-37	97	63	-22	85	56	-22	78	41	-12	53	-15	+10	-25
March	69	-16	85	69	-16	85	70	-14	84	70	-3	73	66	-13	79	49	-12	61	65	-13	78	70	-18	88	+5	-5	+10
April..	82	17	65	87	7	80	79	5	74	78	8	70	91	5	86	83	18	65	83	9	74	84	19	65	+1	+10	-9
May...	98	26	72	98	33	65	84	22	62	83	29	54	93	27	66	92	24	68	90	24	66	85	31	54	-5	+7	-12
June..	99	37	62	91	37	54	92	27	65	96	39	57	97	37	60	99	35	64	96	33	63	99	34	65	+3	+1	+2
July...	100	38	62	95	39	56	102	46	56	99	37	62	104	42	62	98	42	56	98	41	57	106	47	61	+10	+6	+4
Aug...	97	36	61	96	35	61	94	38	56	100	42	58	104	42	62	103	46	57	97	37	60	94	44	50	-3	+7	-10
Sept..	98	28	70	88	22	66	98	28	70	98	32	66	103	21	82	95	36	59	94	28	66	93	33	60	-1	+5	-6
Oct...	80	10	70	77	15	62	91	25	66	89	16	73	85	21	64	89	25	64	84	19	65	81	22	59	-3	+3	-6
Nov...	72	-1	73	67	-3	70	65	-5	70	67	3	64	84	19	65	69	10	59	69	2	67	63	7	56	-6	+5	-11
Dec...	63	-24	87	59	-16	75	57	-16	73	51	-17	68	59	-17	76	54	-7	61	58	-11	69	59	-10	69	+1	+1	=

*For the twenty-five years, 1877-1901, the highest temperature was 108° at Marquette, July 15, 1901; the lowest was -37°, at Sault Ste. Marie, February 10, 1899.

TABLE XVII.—Average absolute humidity, by year and months in 1901, compared with annual and monthly averages for 1900, and for the 24 years, 1877-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Absolute humidity.—Grains of vapor in a cubic foot of air.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 24 years, { 1877-1900.....}	3.48	1.45	1.50	1.81	2.86	4.03	5.54	6.09	5.82	4.95	3.56	2.34	1.78
1900 (6 stations)....	3.67	1.63	1.27	1.42	2.93	4.23	5.41	6.28	7.02	5.38	4.47	2.39	1.61
1901 (7 stations)....	3.51	1.43	.95	1.91	2.83	3.91	5.76	6.86	6.13	5.01	3.56	2.13	1.58
In 1901 greater than av. for 24 years, 1877-1900.....	.03	-----	-----	.10	-----	-----	.22	.77	.31	.06	0	-----	-----
In 1901 less than av. for 24 years, 1877-1900.....	-----	.02	.55	-----	.03	.12	-----	-----	-----	-----	-----	.21	.20
In 1901 greater than in 1900.....	-----	-----	-----	.49	-----	-----	.35	.58	-----	-----	-----	-----	-----
In 1901 less than in 1900.....	.16	.20	.32	-----	.10	.32	-----	-----	.89	.37	.91	.26	.03

*At from 6 to 23 stations per year for the 24 years, 1877-1900. Just which stations in each year, up to 1897, are shown on page 27, report for 1898.

NOTE.—Beginning with the year 1885, allowance must be made for Lansing in Table XVII., because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, on page 23, report for 1886.

TABLE XVIII.—Average relative humidity, by years and months, in 1901, compared with annual and monthly averages for 1900, and for the 23 years, 1878-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Per cent of saturation.—Relative humidity.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 23 years, } 1878-1900 ----- }	77	83	82	79	71	71	73	72	73	76	77	80	83
1900 (7 stations).....	79	82	83	81	73	72	76	77	78	77	80	84	80
1901 (8 stations).....	78	82	78	80	71	76	75	74	77	78	76	80	84
In 1901 greater than av. for 23 years, 1878-1900....	1	-----	-----	1	0	5	2	2	4	2	-----	0	1
In 1901 less than av. for 23 years, 1878-1900.....	-----	1	4	-----	-----	-----	-----	-----	-----	-----	1	-----	-----
In 1901 greater than in 1900.....	-----	-----	-----	-----	-----	4	-----	-----	-----	1	-----	-----	4
In 1901 less than in 1900.....	1	0	5	1	2	-----	1	3	1	-----	4	4	-----

*At from 7 to 22 stations per year for the 23 years, 1878-1900. Just which stations in each year, up to 1897, are shown on page 23, report for 1898.

NOTE.—Beginning with the year 1885, allowance must be made for Lansing in Table XVIII., because of a change in the location of instruments. The amount of the variation is shown in Exhibit D, on page 23, report for 1886.

22 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XIX.—ABSOLUTE HUMIDITY.—*The average number of grains of vapor of water in a cubic foot of air for months and year 1901, at 7 stations in Michigan; also average line for the 7 stations.—Average of observations made daily at 7 A. M., 2 P. M., and 9 P. M., by observers* for the State Board of Health.*

Stations in Michigan.*	Divisions of the State. †	Grains of vapor in a cubic foot of air.—(Absolute humidity.)‡													
		Year.		Months, 1901.											
		Norm. §	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 7 stations¶	-----		3.51	1.43	0.95	1.91	2.83	3.91	5.76	6.86	6.13	5.01	3.56	2.13	1.58
Traverse City....	N. W.	3.42 ²⁰	3.48	1.57	1.01	1.91	2.79	3.66	5.16 ^f	6.74 ^d	6.29 ^b	4.97	3.66	2.30	1.74
Harrisville.....	N. E.	3.12 ⁷	3.09	.94	.61	1.29	2.66	3.37	4.76	6.37	5.97	4.85	3.34	1.87	1.10
Thornville.....	B. & E.	3.66 ²⁵	3.66	1.70	1.26	2.16	2.99	4.18	6.12	6.89	6.02	5.10	3.44	2.22	1.79
Lansing, S. B. of H. |	C.	3.39 ²³	3.47	1.39	.92	1.93	2.80	3.98	5.95	6.81	6.00	4.80	3.41	2.06	1.53
Ann Arbor.....	S. C.	3.62 ⁹	3.50	1.39	.95 ^g	1.88 ^h	2.63	3.92	6.02	7.26	6.09	5.06 ^c	3.52 ^a	1.90	1.39
Battle Creek....	S. C.	-----	3.62	1.54	1.05 ^g	2.16 ^h	2.88	3.98	6.01	6.50	6.00	5.02 ^c	3.97 ^a	2.43	1.93
Tecumseh.....	S. C.	-----	3.72	1.50	.88	2.04	3.06	4.31	6.30	7.45	6.57	5.27	3.60	2.13	1.58

*The names of the observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

†The full names of the divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and in preceding reports.

‡The number of grains of vapor in a cubic foot of air at each observation was determined from readings of the psychrometer by means of Glaisher's table, Table XII, of the Smithsonian Meteorological and Physical Tables (1859).

§Numbers in this column state the average annual absolute humidity for periods of years ending in each case with December 31, 1901. The small figures above and at the right of numbers which state the absolute humidity denote the number of years included in the average.

¶This line is an average for the 7 stations from which statements complete, or nearly complete were received for every month of the year.

||Beginning with the year 1885, allowance must be made for Lansing in Table XIX because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, page 23, report for 1886.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations.

b For 90 observations.

c For 89 observations.

d For 84 observations.

e For 70 observations.

f For 64 observations.

g For 57 observations.

h For 51 observations.

NOTE.—The computations of absolute humidity at Ann Arbor for each month in 1901 were furnished by the observer there. All other computations in Table XIX were made at the office of the Secretary of the State Board of Health.

The "average" line and the lines for the seven stations in Table XIX are graphically represented in Diagram III.

[illegible]

24 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XX.—RELATIVE HUMIDITY.—Average per cent of saturation of the atmosphere with vapor of water for months and year 1901, at 8 stations in Michigan; also average line for the 8 stations. Average of observations made daily at 7 A. M., 2 P. M., and 9 P. M., by observers* for the State Board of Health.

Stations in Michigan.*	Divisions of the State.†	Per cent of saturation.—Relative humidity.													
		Year.		Months, 1901.											
		Norm. ‡	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 stations §			78	82	78	80	71	76	75	74	77	78	76	80	84
Traverse City.....	N. W.	81 ⁹⁰ ₇	81	90	76	89	72	78	76	76	80	80	78	83	93
Harrisville	N. E.	70 ²⁴	71	62	51	67	75	76	75	79	81	79	74	72	61
Thornville.....	B. & E.	78 ³⁸	79	93	94 ³	88	73	74	72	70	71	70	70	82	91
Agr'l College.....	C.	81 ²³	92	97	100 ^r	95	84	87	89	91	91	91	89	92	97
Lansing S. B. of H. ¶	C.	72 ²	73	77	75	77	62	71	72	69	75	73	69	74	77
Ann Arbor.....	S. C.	78	77	84	85 ^g _h	81	69	74	72	72	75	79 ^c _a	75	78	82
Battle Creek	S. C.		72	74	74 ^h _g	69	62	68	67	61	67	70	76	84	94
Tecumseh	S. C.		76	79	70 ^u	77	72	78	76	76	75	79	76	77	79

*The names of observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

†The full names of the divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and in preceding reports.

‡Numbers in this column state the average annual relative humidity for periods of years ending in each case with December 31, 1901. The small figures above and at the right of the numbers which state the relative humidity, denote the number of years included in the average.

§This line is an average for the 8 stations from which statements complete, or nearly complete were received for every month in the year.

¶Beginning with the year 1885, allowance must be made for Lansing in Table XX, because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit D, on page 23, report for 1886.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations.

b For 90 observations.

c For 89 observations.

d For 84 observations.

e For 70 observations.

f For 64 observations.

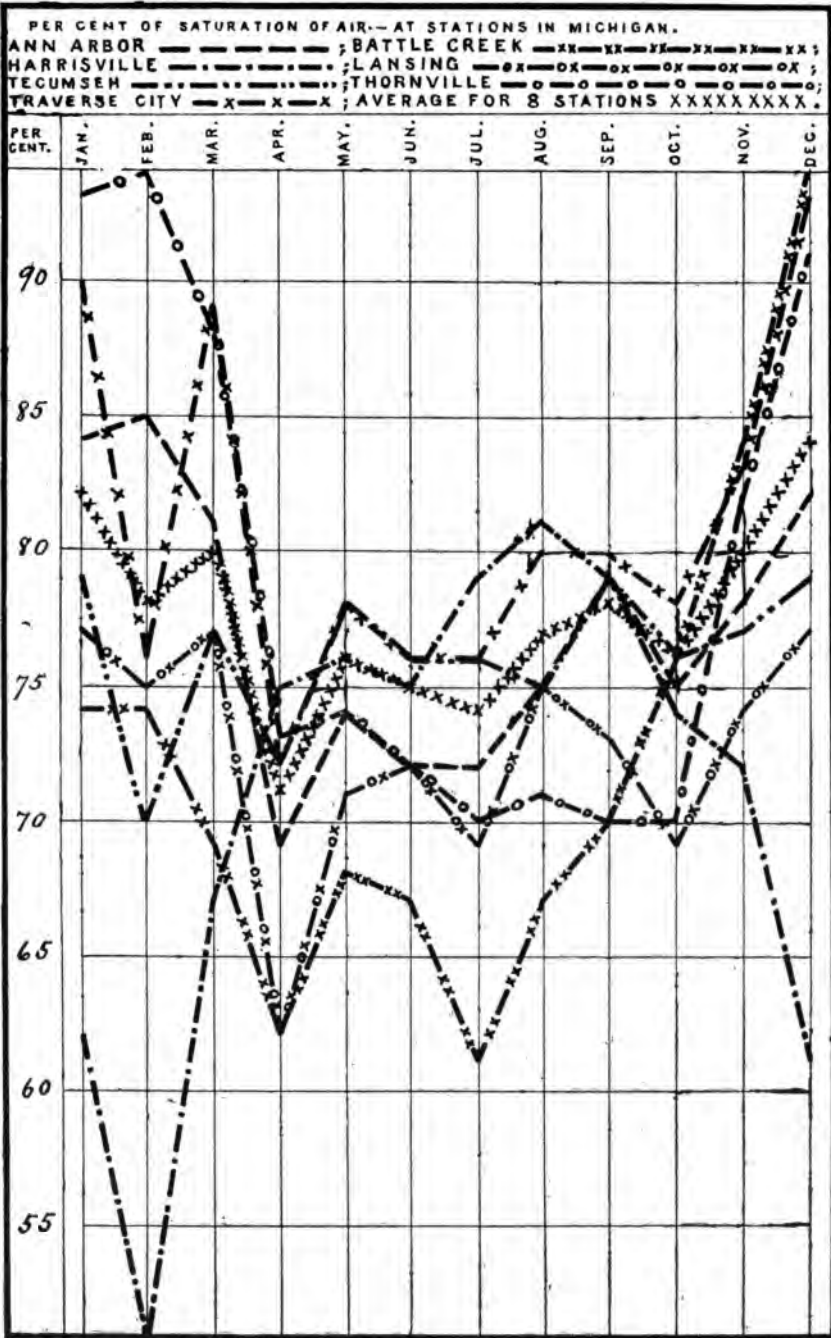
g For 57 observations.

h For 51 observations.

NOTE.—The observations in Table XX were reduced by Guyot's table, in Smithsonian Meteorological Tables, or by a table substantially the same as that. Computations for Ann Arbor and the Agricultural College in 1901 were made by the observers there. All other computations in Table XX were made at the office of the State Board of Health.

Graphic representations of eight representative lines in Table XX are given in Diagram IV.

DIAGRAM IV.—RELATIVE HUMIDITY, BY MONTHS, 1901.



[PLATE III]

Fogs.—For the year 1901, fog was reported at 10 morning observations, at 1 afternoon observation (at about 2 P. M.), at 1 evening observation (at about 9 P. M.), and 4 times during the day, no special time being mentioned, in many cases the same fog, or fog at the same time, being reported by different observers. Fog was reported, at one or more stations at some time during the day, on 16 days.

TABLE XXI.—*Number of different days on which fog was observed at one or more of 6 stations in Michigan* in 1901, and each month of the year 1901.*

Year.	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
14	0	0	1	1	4	0	1	2	0	1	0	4

*This exhibit contains statements only for those localities from which reports were received for every month of the year, as follows: Harrisville, Traverse City, Thornville, Lansing, Tecumseh and Detroit.

Table XXI, "Number of different days on which fog was observed," etc., supplies knowledge of the *time*, in each month, on which fog was observed, somewhere in Michigan. Table XXII, "Number of observations at which fog was observed," etc., supplies knowledge of the *time* combined with the *area* of the occurrences of fog. For the State as a whole, therefore, the last mentioned exhibit supplies the most important information. Therefore, in this report the diagram relative to fog is made to exhibit the facts contained in this last-mentioned table. Heretofore it has represented the "Number of different days on which fog was observed at one or more stations in Michigan."

TABLE XXII.—*Number of observations at which fog was observed in Michigan in 1901, and in each month of the year 1901. (Observations taken three times daily,* at 6 stations.)†*

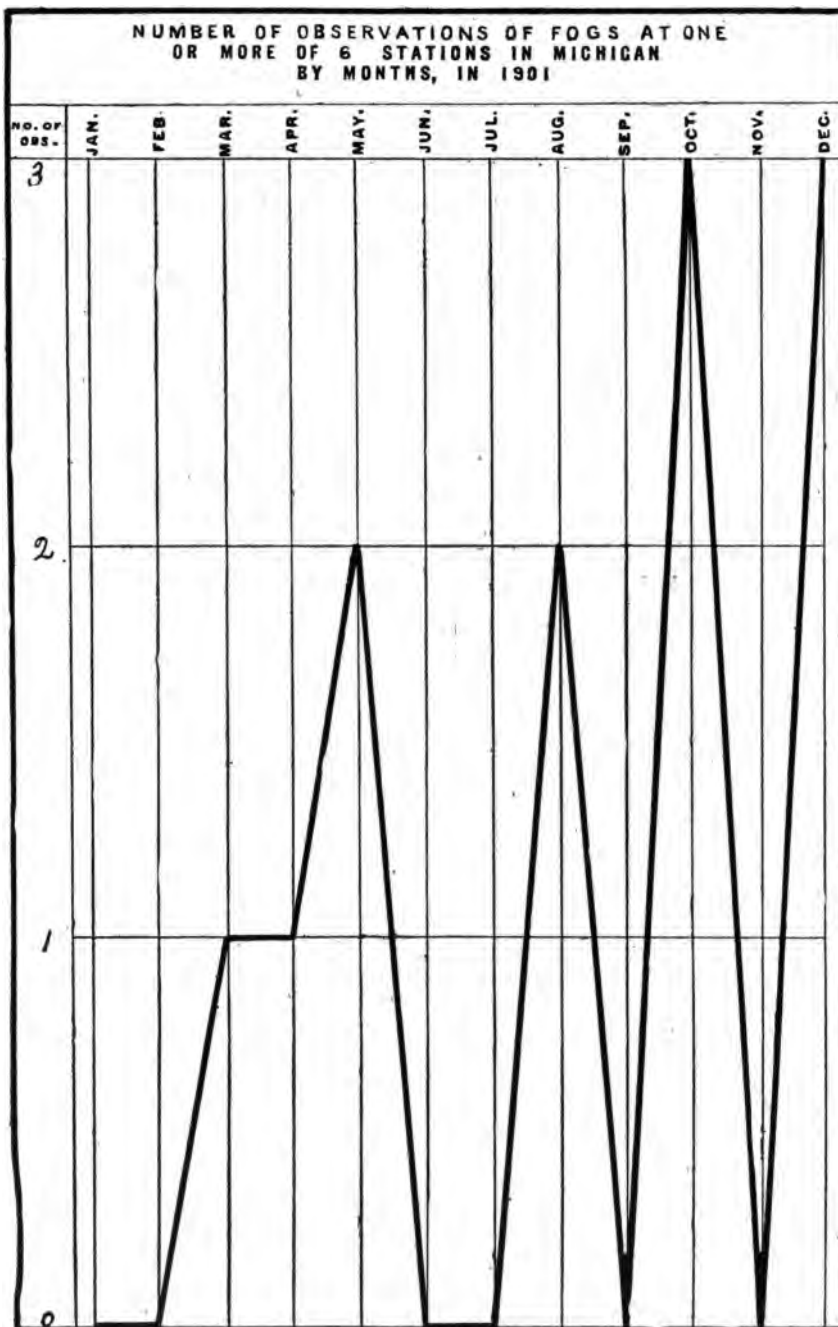
Year.	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
12	0	0	1	1	2	0	0	2	0	3	0	3

* At the U. S. Weather Bureau Stations the observations were made at 8 A. M. and 8 P. M., 75th Meridian time.

† This exhibit contains statements only for those localities from which registers were received for every month of the year; the localities are stated in a foot-note to Table XXI, above.

Graphic representations of statements in Table XXII are given in Diagram V.

DIAGRAM V.—CONCERNING FOGS IN MICHIGAN, IN 1901.



28 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XXIII.—Average per cent of cloudiness for months and year 1901, at 8 stations in Michigan; also average line for the 8 stations. Average of observations made daily at 7 A. M., 2 P. M. and 9 P. M., by observers* for the State Board of Health.

Stations in Michigan.*	Divisions of the State.†	Average per cent of cloudiness.													
		Year.		Months, 1901.											
		Norm. ‡	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 stations§			56	75	60	68	52	59	41	38	48	44	41	71	68
Traverse City.....	N. W.	59 ²⁰	60	88	58	c 72	h 42	d 58	g 37	e 43	a 40	f 55	a 59	c 81	b 86
Harrisville.....	N. E.	62 ¹⁷	66	80	67	74	53	62	d 52	55	62	57	62	e 83	86
Thornville.....	B. & E.	51 ²⁵	53	74	60	64	53	57	41	37	44	43	27	65	65
Agr'l College.....	C.	56 ³⁸	48	72	56	64	44	53	37	25	39	36	29	62	55
Lansing S.B. of H.	C.	57 ²³	58	76	64	69 a	58	64	48	39	51	45	44 b	73	67 b
Ann Arbor.....	S. C.	56 ²²	58	74	64	73 j	59	63	46	41	53	40	38	72	70
Battle Creek.....	S. C.	48 ³	53	65	64	58 i	52	56 a	37	36 a	56 a	43 c	36 a	68	62 a
Tecumseh.....	S. C.		48	69	49	66	52	55	33	26	38	32	34	65	56

*The names of observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

†The full names of divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and preceding reports.

‡Numbers in this column state the average per cent of cloudiness for periods of years ending in each case with December 31, 1901. The small figures above and at the right of numbers which state the per cent of cloudiness, denote the number of years included in the average.

§This line is an average for all the stations from which statements, complete, or nearly complete, were received for every month of the year.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

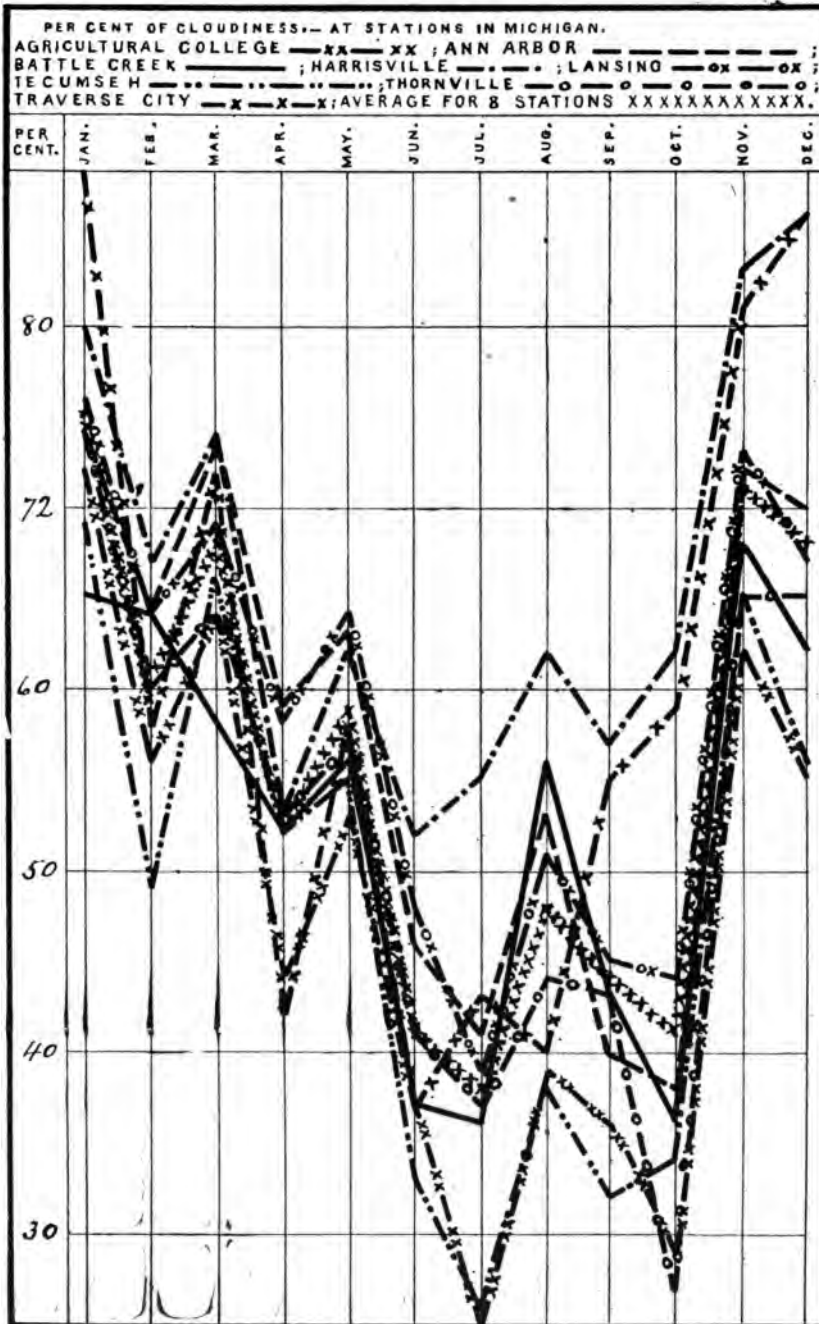
a For 92 observations. b For 91 observations. c. For 89 observations. d. For 88 observations.

e For 85 observations. f For 82 observations. g For 69 observations. h For 59 observations.

i For 57 observations. j For 51 observations.

Graphic representations of nine representative lines in Table XXIII are given in Diagram VI.

DIAGRAM VI.—AV. PER CENT OF CLOUDINESS, BY MONTHS, 1901.



30 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XXV.—*Dates of solar and lunar halos*

Line number.	Stations.	Dates of halos recorded,									
		January.		February.		March.		April.		May.	
		Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.
1	Marquette.....		30,31		25,26	30	30				
2	Port Huron.....				24,28						
3	Thornville.....								19,29		
4	Lansing, S. B. of H...	15		2,8,21		4,12,16		5,20	1	27	
5	Detroit.....		4,31								

TABLE XXIV.—*Average per cent of cloudiness, by year and months, in 1901, compared with annual and monthly averages for 1900, and for 24 years, 1877-1900.* These averages are for groups of several stations in Michigan.*

Years, etc.	Per cent of cloudiness.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 24 yrs, 1877-1900.	55	71	65	58	52	50	46	40	42	44	56	69	74
1900 (9 stations)	53	78	64	55	43	53	35	44	41	43	45	68	71
1901 (8 stations)	56	75	60	68	52	59	41	38	48	44	41	71	68
In 1901 greater than av. for 24 years, 1877-1900.	1	4	-----	10	0	9	-----	-----	6	0	-----	2	-----
In 1901 less than av. for 24 years, 1877-1900	-----	-----	5	-----	-----	-----	5	2	-----	-----	15	-----	6
In 1901 greater than in 1900.	3	-----	-----	13	9	6	6	-----	7	1	-----	3	-----
In 1901 less than in 1900	-----	3	4	-----	-----	-----	-----	6	-----	-----	4	-----	3

*At from 8 to 23 stations per year for the twenty-four years, 1879-1900. Just which stations in each year, up to 1897, are shown on page 48, report for 1898.

recorded on the monthly registers in 1901.

months, 1901.														Line number.
June.		July.		August.		September.		October.		November.		December.		
Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	
												16	25	1
														2
									27					3
6				16				30		21	6,16,22	19		4
								1	30					5

Perhelia, Jan. 31; Feb. 1, 4, 10, 19; Nov. 10; Dec. 6, 16.—*Lansing.*

TABLE XXVI.—Inches of rain and melted snow, by year and months in 1901, compared with annual and monthly averages for 1900, and for the 24 years, 1877-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Inches of rain and melted snow.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 24 yrs. 1877-1900	33.92	2.26	2.32	2.26	2.44	3.50	3.56	3.02	2.96	3.05	3.03	3.06	2.49
1900 (13 stations)...	30.07	1.38	2.92	1.93	1.67	2.99	2.50	4.19	3.23	2.62	2.47	3.39	.78
1901 (13 stations)...	29.11	1.69	1.31	2.69	1.65	2.68	2.44	4.30	2.75	2.40	3.19	1.47	2.53
In 1901 greater than av. for 24 years, 1877-1900...				.43				1.28			.16		.04
In 1901 less than av. for 24 years, 1877-1900.....	4.81	.57	1.01		.79	.82	1.12		.21	.65		1.59	
In 1901 greater than in 1900.....		.31		.76				.11			.72		1.75
In 1901 less than in 1900.....	.96		1.61		.02	.31	.06		.48	.22		1.92	

*At from 12 to 23 stations per year for the 24 years, 1877-1900. Just which stations in each year, up to 1897, are shown on page 50, report for 1898.

32 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XXVII.—Inches of rain and melted snow for months and year 1901, at 13 stations in Michigan; also average line for 13 stations,—as compiled from daily observations made by observers* for the State Board of Health, and for the U. S. Weather Bureau.

Stations in Michigan.* (Those of the U. S. Weather Bureau in italics.)	Divisions of the State. †	Inches of rain and melted snow.													
		Year.		Months, 1901.											
		Norm. ‡	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 13 stations §	-----	-----	29.11	1.69	1.31	2.69	1.65	2.68	2.44	4.30	2.75	2.40	3.19	1.47	2.53
<i>Marquette</i>	U. P.	¹⁶ 32.09	37.19	2.08	.83	2.72	1.14	4.84	3.89	5.96	2.31	4.44	3.12	3.82	2.04
<i>Sault Ste. Marie</i> ..	U. P.	¹⁰ 32.64	27.38	1.40	.22	2.11	.82	1.55	3.37	4.95	3.01	2.31	5.39	1.33	.92
Traverse City.....	N. W.	²⁰ 36.22	28.05	2.36	1.15	3.09	.72	2.46	2.13	4.19	2.70	3.40	2.88	1.15	1.82
<i>Alpena</i>	N. E.	²⁹ 33.95	25.23	1.20	.35	3.25	1.51	2.70	1.11	3.95	2.25	3.36	3.06	.85	1.64
Harrisville	N. E.	¹⁵ 33.48	33.14	1.81	.80	5.60	2.93	3.26	1.62	3.50	4.36	3.19	3.47	.93	1.67
<i>Grand Haven</i>	W.	¹¹ 33.27	26.45	1.96	1.90	3.71	.65	1.62	2.16	3.90	.42	2.98	2.33	1.75	3.07
<i>Port Huron</i>	B. & E.	²⁷ 30.99	20.36	1.10	1.38	1.37	1.78	2.95	1.26	2.67	.54	2.13	1.14	1.19	2.85
Thornville.....	B. & E.	²⁵ 31.78	27.35	1.73	1.98	1.02	1.27	3.22	2.53	3.25	3.34	1.41	3.12	1.47	3.01
Agr'l College	C.	³⁸ 30.86	32.23	1.51	1.81	2.94	2.16	2.36	3.57	5.08	2.49	1.67	4.61	1.21	2.82
Lansing S. B. { of H.	C.	²² 32.79	35.17	1.69	1.26	2.97	2.29	2.67	3.75	6.33	3.24	1.88	4.87	1.32	2.90
Ann Arbor.....	S. C.	¹⁴ 29.37	26.09	1.45	2.22	1.74	1.63	1.72	2.01	3.35	3.14	1.95	2.55	1.28	3.05
Tecumseh	S. C.	³⁰ 30.95	2.16	1.48	2.64	2.48	2.78	2.27	3.23	4.76	.81	3.06	1.82	3.46	
<i>Detroit</i>	S. E.	³⁰ 32.39	28.78	1.52	1.64	1.80	2.07	2.76	2.08	5.50	3.20	1.65	1.90	1.00	3.66

*The names of observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

†The names of divisions, and the counties in each, are stated in Exhibit I, in the annual report for 1898 and preceding reports.

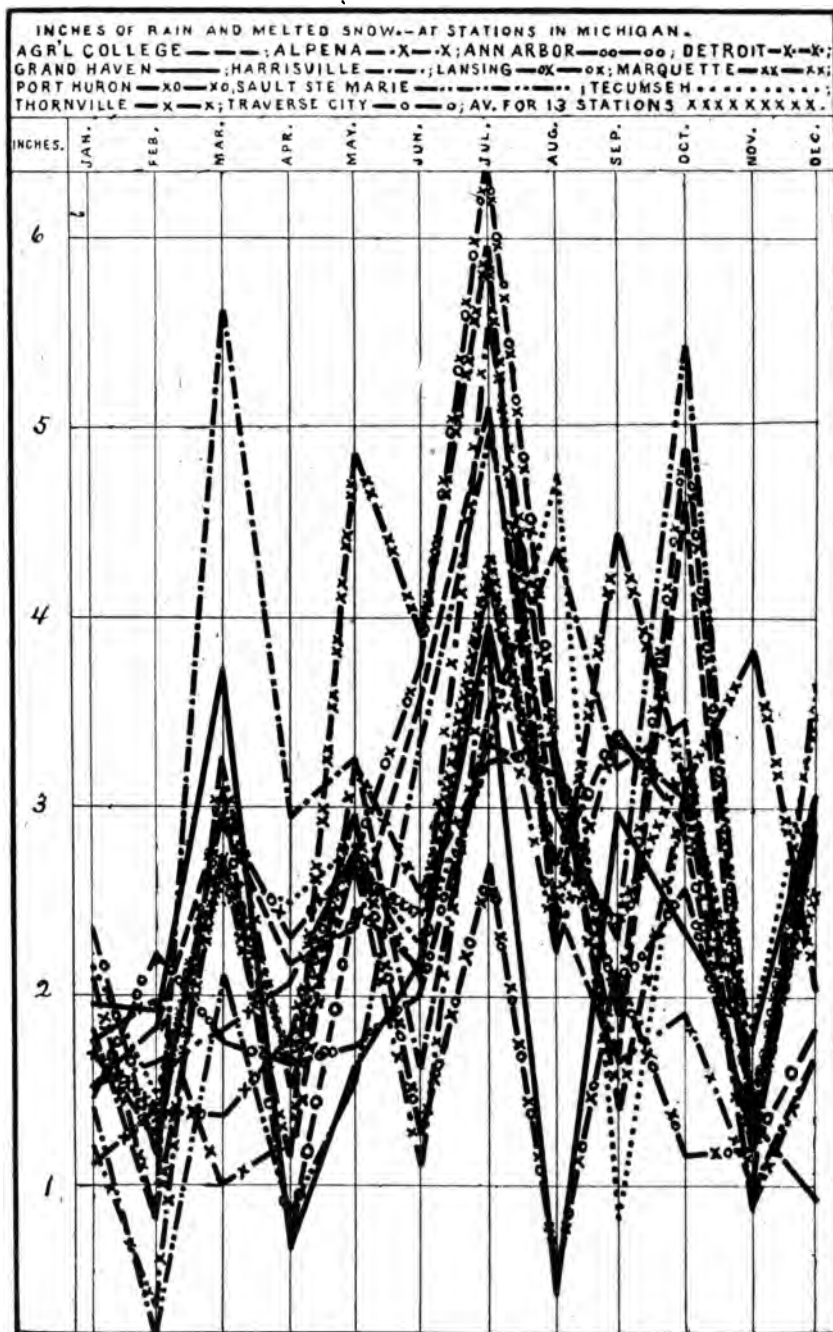
‡Numbers in this column state the annual average rainfall for periods of years ending in each case with December 31, 1901. The small figures above and at the right of numbers which state the rainfall denote the number of years included in the average.

§This line is an average for all the stations, from which statements are given for every month of the year.

NOTE.—The computations of amount of rainfall were furnished by the observers at Detroit, Alpena, Grand Haven, Port Huron, Ann Arbor, Sault Ste. Marie, Marquette, and the Agricultural College for the year. All other computations in Table XXVII were made in the office of the Secretary of the State Board of Health.

The average line and lines for the thirteen representative stations in Table XXVII are graphically represented in Diagram VII.

DIAGRAM VII.—RAINFALL, BY MONTHS, 1901.



[PLATE 1120]

34 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XXVIII.—*Relative amount of ozone in the atmosphere by day, for months and year 1901, at 8 stations, also average line for 7 stations in Michigan, as indicated by averages of observations made daily by exposing test-paper prepared according to Schonbein's formula, from 7 A. M. to 2 P. M.—Recorded according to a scale of 10 degrees of coloration of the test-paper (greatest coloration by ozone equals 10) by observers for the State Board of Health, and for the U. S. Weather Bureau.**

Stations in Michigan.† (Those of the U. S. Weather Bureau in italics.)	Divisions of the State.†	Degrees of coloration of test-paper.—Day observations.‡													
		Year.		Months, 1901.											
		Norm. §	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	i Nov.	Dec.
Av. for 7 stations. ||	-----	-----	3.89	3.96	4.14	4.45	3.79	4.50	4.29	3.90	4.62	3.39	3.18	3.29	3.20
Traverse City....	N. W.	5.39 ³⁰	6.57	6.70	7.01	6.70	6.75 ^f	7.09	7.06 ^e	6.59 ^c	6.95	6.08	5.82	6.11	5.95
Harrisville.....	N. E.	3.46 ¹⁷	2.51	3.15	2.68	3.02	2.34	3.05	2.54	1.85	2.92	1.68	2.01	2.48	2.37
<i>Grand Haven</i>	W.	-----	4.49	4.04	4.79	5.03	3.49	5.75	4.97	4.96	5.02	3.23	4.30	4.26 ^a	4.02
Thornville.....	B. & E.	3.29 ²⁵	4.74	7.15	6.54	6.86	4.77	4.09	3.67	3.08	3.82	3.64	3.21	4.68	5.37
Lansing S.B. of H.	C.	2.92 ²³	2.39	1.83	2.61	2.12	1.50 ^d	3.05	3.97	2.53	3.60 ^a	2.34 ^e	2.34	1.58 ^b	1.15
Ann Arbor.....	S. C.	2.80 ⁹	2.89	1.28	1.72	3.40 ^g	4.00	3.35	3.88 ^h	4.72	5.11	3.28	1.82	1.01	1.05
Battle Creek....	S. C.	2.45 ³	2.72	3.99	5.05	3.06	2.64	3.93	3.27	2.69	3.18	1.98	2.08	.67	.05
Tecumseh.....	S. C.	-----	3.67	3.48	3.61	4.02	3.70	5.15	3.94	3.56	4.89	3.51	2.79	2.88	2.50

*At the stations of the U. S. Weather Bureau during the year 1901, the observations were made by exposing the test-paper from 8 A. M. to 8 P. M., all 75th Meridian time. The corresponding local time for some of these stations is stated in a foot-note to Table XIV.

†The names of observers, their places of observation and the counties in which these places are situated, are stated in Table I. The full names of the divisions and counties in each division are stated in Exhibit I, in the annual report for 1898 and preceding reports.

‡Allowance made for difference in sensitiveness of test-paper; explained below. "i." §Numbers in this column state the average annual relative amount of ozone by day for periods of years ending in each case with December 31, 1901. The small figures above and at the right of numbers which state the average denote the number of years included in the average.

||This line is an average for only the stations from which statements complete, or nearly complete were received for every month in the year. It does not include Grand Haven.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 23 days. f For 21 days. g For 19 days. h For 17 days.

i Concerning Ozone Corrections.—It is now believed that the correction (for variation in sensitiveness of different lots of test-paper) applied to the monthly averages in the tables for the day and the night ozone, for the month of November in each of the years 1891, 1892 and 1893, at stations in Michigan and at Lansing, was .39 too great for the day (7 A. M. to 2 P. M.) and .54 for the night ozone (9 P. M. to 7 A. M.). This should be taken into consideration in studying the tables relative to ozone in the annual reports of this board for those years.

Seven lines in this table are represented in Diagram VIII.

TABLE XXIX.—*Relative amount of ozone in the atmosphere at night for months and year 1901, at 8 stations, also average line for 7 stations in Michigan—as indicated by averages of observations made nightly by exposing test-paper, prepared according to Schonbein's formula, from 9 P. M. to 7 A. M.—Recorded according to a scale of 10 degrees of coloration of the test-paper (greatest coloration by ozone equals 10) by observers for the State Board of Health, and for the U. S. Weather Bureau.**

Stations in Michigan.† (Those of the U. S. Weather Bureau in italics.)	Divisions of the State.‡	Degrees of coloration of test-paper.—Night observations.§													
		Year.		Months, 1901.											
		Norm. ||	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 7 stations¶			4.38	4.38	4.41	4.98	4.25	5.27	4.99	4.48	4.92	3.73	3.65	3.61	3.85
Traverse City....	N. W.	5.33 ²⁰	6.49	7.50	6.97	6.83	6.20	7.00	7.13	6.54	6.39	5.38	5.36	6.10	6.47
Harrisville	N. E.	3.93 ¹⁷	2.88	2.99	3.37	3.21	2.90	2.99	2.91	2.32	3.14	2.31	2.65	2.86	2.96
<i>Grand Haven</i>	W.		5.23	5.62	5.56	6.21	4.70	6.80	6.61	6.01	7.52	4.34	6.12	4.75	5.69
Thornville	B. & E.	4.17 ²⁵	6.08	7.54	7.94	7.96	5.90	6.48	5.91	5.09	5.27	4.91	3.95	5.80	6.18
Lansing, S. B. of H.	C.	3.26 ²³	2.52	2.18	1.44	2.86	1.94	3.61	4.21	3.42	3.56	2.14	2.04	1.30	1.51
Ann Arbor.....	S. C.	2.64 ⁹	2.53	1.41	1.58	2.77	3.70	4.44	3.22	3.19	2.88	2.88	1.95	1.12	1.25
Battle Creek....	S. C.	2.83 ³	2.86	3.44	4.11	3.62	3.60	4.54	3.47	3.03	3.56	1.44	1.40	1.67	.44
Tecumseh.....	S. C.		4.31	3.41	4.04	5.05	4.44	5.57	4.91	4.77	5.68	4.18	3.46	3.33	2.86

*At the U. S. Weather Bureau Stations during the year 1901 the observations were made by exposing the test-paper from 8 P. M. to 8 A. M., 75th Meridian time. The corresponding local time for some of these stations is stated in a foot-note to Table XIV.

†The names of observers, their places of observation, and the counties in which these places are situated, are stated in Table I.

‡The full names of the divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and preceding reports.

§Allowance has been made for difference in sensitiveness in test-paper; explained in foot-note "i," Table VIII.

||Numbers in this column state the average annual relative amount of ozone by night for periods of years ending in each case with December 31, 1901. The small figures above and at the right of the numbers which state the average denote the number of years included in the average.

¶This line is an average for only the stations from which statements, complete, or nearly complete, were received for every month in the year. It does not include Grand Haven.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 22 days. f For 19 days. g For 17 days.

Seven lines in this table are graphically represented in Diagram IX.

38 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XXX.—Average amount of atmospheric ozone (day), by year and months, in 1901, compared with annual and monthly averages for 1900, and for the 24 years, 1877-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Ozone by day.—Degrees of coloration of test-paper.†												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 24 yrs., 1877-1900	3.46	3.71	3.81	3.87	3.60	3.74	3.47	3.00	3.47	3.08	3.12	3.18	3.47
1900 (7 stations)....	3.40	3.63	3.72	4.32	3.48	4.05	3.92	3.16	3.87	2.41	2.54	2.84	2.88
1901 (7 stations)....	3.89	3.96	4.14	4.45	3.79	4.50	4.29	3.90	4.62	3.39	3.18	3.29	3.20
In 1901 greater than av. for 24 years, 1877-1900....	.43	.25	.33	.58	.19	.76	.82	.90	1.15	.31	.06	.11	.....
In 1901 less than av. for 24 years, 1877-1900.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.27
In 1901 greater than in 1900.....	.49	.33	.42	.13	.31	.45	.37	.74	.75	.98	.64	.45	.32
In 1901 less than in 1900.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*At from 6 to 20 stations per year for the 24 years, 1877-1900. Just which stations in each year, up to 1897, are shown on page 58, report for 1898.

†In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.

TABLE XXXI.—Average amount of atmospheric ozone (night), by year and months, in 1901, compared with annual and monthly averages for 1900, and for the 24 years, 1877-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Ozone by night.—Degrees of coloration of test-paper.†												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 24 yrs., 1877-1900	3.68	3.94	4.30	4.31	4.02	4.02	3.73	3.11	3.36	3.01	3.25	3.45	3.87
1900 (7 stations)....	3.69	3.52	4.22	4.66	4.23	4.78	4.73	3.45	3.64	2.88	2.13	2.88	3.18
1901 (7 stations)....	4.38	4.38	4.41	4.98	4.25	5.27	4.99	4.48	4.92	3.73	3.65	3.61	3.85
In 1901 greater than av. for 24 years, 1877-1900....	.70	.44	.11	.67	.23	1.25	1.26	1.37	1.56	.72	.40	.16	.....
In 1901 less than av. for 24 years, 1877-1900.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.02
In 1901 greater than in 1900.....	.69	.86	.19	.32	.02	.49	.26	1.03	1.28	.85	1.52	.73	.67
In 1901 less than in 1900.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*At from 6 to 20 stations per year for the 24 years, 1877-1900. Just which stations in each year, up to 1897, are shown on page 58, report for 1898.

†In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.

Observations for Ozone at Lansing.—Since July 1, 1884, the observations for ozone at Lansing have been taken at the new shelter for meteorological instruments in the southwest part of the Capitol yard. Previous to July 1, 1884, the observations had been taken at the office window. Exhibit E, page 60, of the report for 1885, shows that the average for the month of July, 1884, is greater at each observation—7 A. M. to 2 P. M., 2 P. M. to 9 P. M., and 9 P. M. to 7 A. M., at the shelter for instruments than at the office window. Possibly this fact should be taken into consideration in studying ozone at Lansing through a long period of years.

TABLE XXXII.—Average velocity of the wind in miles per hour, by year and months in 1901, compared with annual and monthly averages for 1900, and for the 19 years, 1882-1900.* From registers of the Robinson self-registering anemometer.† These averages are for groups of several stations in Michigan.

Years, etc.	Average miles per hour.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 19 yrs., 1882-1900	9.6	10.9	10.8	10.3	10.3	9.5	7.9	7.9	7.6	8.8	9.5	10.8	11.0
1900 (7 stations).....	9.8	11.6	11.6	11.5	9.0	9.1	8.5	9.4	7.1	9.1	8.3	10.9	11.4
1901 (8 stations).....	10.3	12.0	11.0	13.3	10.2	9.3	8.3	8.8	7.6	9.6	11.0	11.9	10.1
In 1901 greater than av. for 19 years, 1882-1900...	.7	1.1	.2	2.5	-----	-----	.4	.9	0	.8	1.5	1.1	-----
In 1901 less than av. for 19 years, 1882-1900.....	-----	-----	-----	-----	.1	.2	-----	-----	-----	-----	-----	-----	.9
In 1901 greater than in 1900.....	.5	.4	-----	1.8	1.2	.2	-----	-----	.5	.5	2.7	1.0	-----
In 1901 less than in 1900.....	-----	-----	.6	-----	-----	-----	.2	.6	-----	-----	-----	-----	1.3

*At from 6 to 9 stations per year for the 19 years, 1882-1900.

†Gibson's anemometer was used at Ann Arbor.

TABLE XXXIII.—Average velocity of the wind in miles per hour, by months for the 21 years, 1880-1900, and comparisons of 1901 with this average and with the year 1900. From registers of the Robinson self-registering anemometer in the office of the State Board of Health, State Capitol, Lansing, Michigan.

Years, etc.	Miles, by self-registering anemometer.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 21 yrs., 1880-1900	9.7	11.1	11.4	11.3	10.9	9.5	8.3	7.8	7.2	8.4	8.9	10.9	11.2
1900.....	9.6	11.2	11.4	11.2	9.8	9.0	8.2	9.1	7.1	9.4	6.9	10.5	11.9
1901.....	9.2	9.9	11.0	12.3	8.2	7.9	8.2	7.8	6.2	8.2	10.0	11.5	9.1
In 1901 greater than av. for 21 years, 1880-1900...	-----	-----	-----	1.0	-----	-----	-----	0	-----	-----	1.1	.6	-----
In 1901 less than av. for 21 years, 1880-1900.....	.5	1.2	.4	-----	2.7	1.6	.1	-----	1.0	.2	-----	-----	2.1
In 1901 greater than in 1900.....	-----	-----	-----	1.1	-----	-----	-----	-----	-----	-----	3.1	1.0	-----
In 1901 less than in 1900.....	.4	1.3	.4	-----	1.6	1.1	0	1.3	.9	1.2	-----	-----	2.8

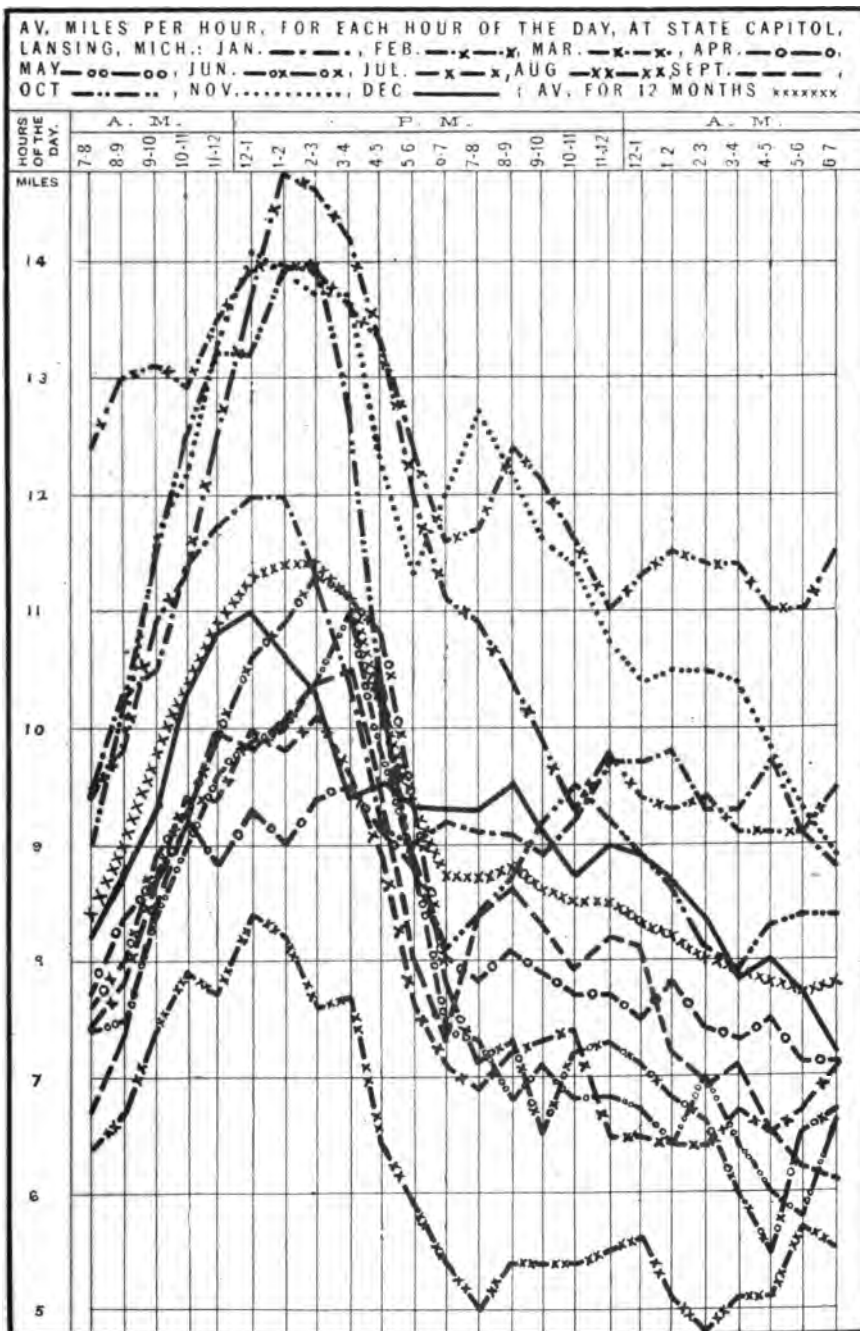
TABLE XXXIV.—Average velocity of the wind in miles per hour for each hour of the day, by months of the year 1901. Compiled from registers of the Robinson self-registering anemometer, exposed above the roof of the Capitol, and registering in the office of the State Board of Health, Lansing, Michigan.

Months.	Averages.			Hours (1901) and average miles per hour.																								
	Av. 22 years, 1880- 1901.	1900.	1901.	A. M.						P. M.						A. M.												
				7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	
Year	9.7	9.7	9.2	8.4	9.0	9.8	10.4	10.9	11.3	11.4	11.4	11.1	10.2	9.3	8.7	8.7	8.8	8.6	8.5	8.5	8.3	8.2	8.0	7.9	7.8	7.7	7.8	
January	11.0	11.2	9.9	9.4	10.3	10.5	11.4	11.7	12.0	12.0	11.3	10.4	9.1	9.0	9.2	9.1	9.1	8.9	9.2	9.7	9.7	9.8	9.3	9.3	9.7	9.1	8.8	
February	11.4	11.3	11.0	10.5	9.8	10.9	11.3	12.5	13.7	14.7	14.6	14.2	13.3	12.0	11.1	10.9	10.4	9.9	9.3	9.8	9.4	9.3	9.4	9.1	9.1	9.1	9.5	
March	11.4	11.3	12.3	12.4	13.0	13.1	12.9	13.5	13.9	14.0	13.9	13.6	13.3	12.3	11.6	11.7	12.4	12.1	11.6	11.0	11.3	11.5	11.4	11.4	11.0	11.0	11.5	
April	10.8	10.0	8.2	7.7	8.4	8.7	9.2	8.8	9.3	9.0	9.4	9.5	9.1	8.8	8.0	7.8	8.1	7.9	7.7	7.7	7.5	7.8	7.4	7.3	7.5	7.1	7.1	
May	9.5	9.0	7.9	7.4	7.5	8.4	9.0	9.6	9.9	10.0	10.4	11.0	9.8	8.8	7.4	7.3	6.8	7.1	6.8	6.8	6.7	6.4	7.0	6.4	6.0	5.8	6.6	
June	8.3	8.2	8.2	7.6	8.0	8.9	9.3	9.9	10.6	10.9	11.3	11.1	10.8	9.3	7.8	7.1	7.3	6.5	7.2	7.3	7.1	6.8	6.6	6.0	5.5	6.5	6.7	
July	7.8	9.1	7.8	7.4	7.8	8.7	9.4	9.4	10.0	9.8	10.1	9.6	8.9	7.6	7.1	6.9	7.2	7.3	7.4	6.5	6.5	6.4	6.4	6.7	6.5	6.7	7.1	
August	7.2	7.1	6.2	6.3	6.7	7.4	7.9	7.7	8.4	8.2	7.6	7.7	6.4	5.9	5.4	5.0	5.4	5.4	5.4	5.5	5.6	5.1	4.8	5.1	5.1	5.7	5.6	
September	8.4	9.3	8.2	8.2	8.7	9.4	8.5	9.2	10.0	9.8	10.0	10.4	10.5	9.5	8.0	7.3	8.4	8.6	8.3	7.9	8.2	8.1	7.2	6.9	7.1	6.5	6.2	6.1
October	8.9	6.9	10.0	10.2	11.5	12.5	13.2	13.2	13.9	14.0	12.7	10.4	8.8	8.1	8.4	8.7	9.2	9.5	9.2	8.9	8.6	8.1	7.9	8.3	8.4	8.4	8.4	
November	10.9	10.5	11.5	10.4	9.9	11.6	12.2	13.3	14.1	13.9	13.7	13.7	12.3	11.3	12.0	12.7	12.2	11.6	11.4	10.7	10.4	10.5	10.5	10.4	9.8	9.3	8.9	
December	11.1	11.9	9.1	8.2	8.7	9.3	10.3	10.8	11.0	10.6	10.3	9.4	9.5	9.3	9.3	9.3	9.5	9.1	8.7	9.0	8.9	8.6	8.3	7.8	8.0	7.7	7.2	

*For only about 28 days †For only about 27 days. ‡For only about 30 days. §For only about 29 days.

The statements in the third figure column in Table XXXIV, of the average velocity of the wind in miles per hour, by months, during the year 1901 are graphically represented in Diagram XI. The remaining columns of Table XXXIV, for 1901, are graphically represented in Diagram X.

DIAGRAM X. VELOCITY OF WIND. BY HOURS AND MONTHS, 1901.



[PLATE 1123]

42 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XXXV.—Average velocity of the wind in miles per hour for the year and for each month of the year 1901, at 8 stations in Michigan; also average for 8 stations. Computed from registers of the Robinson self-registering anemometer,* by observers for the State Board of Health, and for the U. S. Weather Bureau.

Stations in Michigan.†	Divisions of the State.	Miles, by self-registering anemometer.													
		Year.		Months, 1901.											
		Norm. ‡	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 stations.			10.3	12.0	11.0	13.3	10.2	9.3	8.3	8.8	7.6	9.6	11.0	11.9	10.1
Marquette.....	U. P.	9.8 ¹⁶	10.8	13.4	10.8	12.4	8.8	9.2	8.7	9.0	9.2	11.4	12.6	12.5	11.8
Sault Ste. Marie.	U. P.	8.6 ¹⁰	8.2	9.1	7.5	11.5	7.9	8.5	6.8	7.0	5.8	7.3	8.9	10.4	7.8
Alpena.....	N. E.	9.7 ³	10.3	12.2	10.2	14.2	10.4	9.6	8.7	8.8	7.3	9.9	10.4	12.3	9.7
Grand Haven.....	W.		11.7	14.5	13.6	14.7	11.0	9.6	9.7	10.6	8.3	11.1	12.5	13.4	11.2
Port Huron.....	B. & E.	10.7 ²⁰	11.6	13.2	11.6	14.3	12.8	10.8	8.8	9.8	9.1	11.3	12.2	13.4	11.3
Lansing, S. B. } of H.....	C.	9.7 ²²	9.2	9.9	11.0	12.3	8.2	7.9	8.2	7.8	6.2	8.0	10.7	11.5	9.1
Ann Arbor.....	S. C.	8.2 ⁶	8.7	10.8	10.8	11.8	10.1	8.1	6.3	7.2	5.6	7.0	8.1	9.9	8.6
Detroit.....	S. E.	10.0 ²⁰	11.5	12.7	12.6	15.0	12.3	11.0	9.4	10.3	8.9	10.8	12.2	12.0	11.1

*Gibbon's anemometer was used at Ann Arbor.

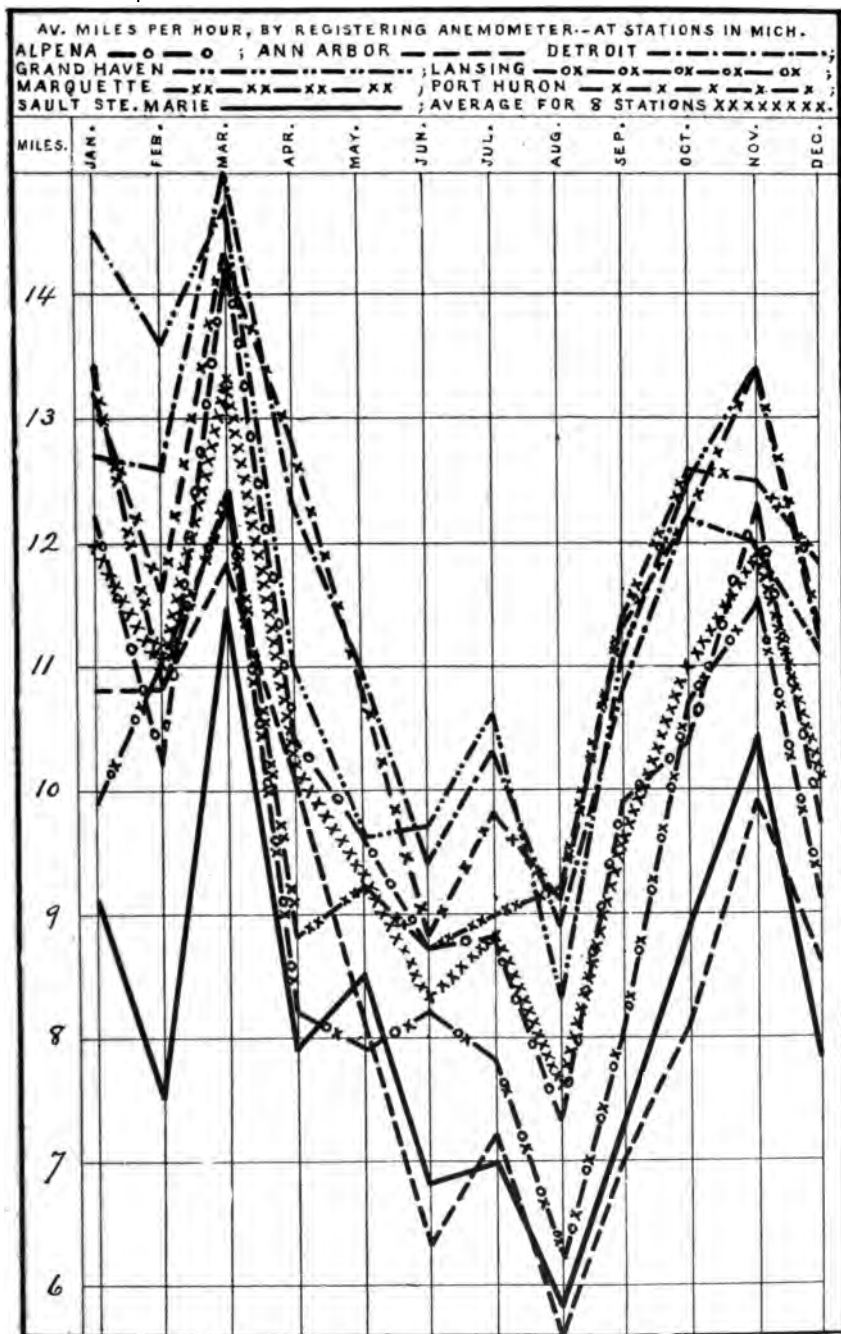
†The names of observers, their places of observation, and the counties in which these places are situated are stated in Table I.

‡Numbers in this column state the average velocity of the wind in miles per hour for periods of years ending in each case with December 31, 1901. The small figures above and at the right of numbers which state the average denote the number of years included in the average.

Graphic representations of statements made in Table XXXV are given in Diagram XI.

Diagrams relating to meteorological conditions.—Most of the diagrams in this paper are to be read by tracing each irregular line across the diagram from left to right, and noting at what point it intersects each of the perpendicular lines having the name of the month at the top. What station is represented by the irregular line may be learned from the head of the diagram. The degree of value denoted by the intersection may be learned by referring to the figures in the left-hand column. Thus in Diagram I, relating to average temperature in 1901, tracing the line “— . —” representing Harrisville, it may be seen that the average temperature at Harrisville was, in March, about 25°, in May about 49°, in August about 66°, in December about 23°, etc. Definite numerical statements of the average temperature for each month at each station may be found in Table IX, and accompanying each diagram is a table giving exact numerical statements for the conditions represented. The average lines given in each table are represented in the corresponding diagram by an × line, thus × × × ×. The lines in the diagrams give more ready general comparisons of stations with each other, or of months, with each other, than is possible from the mere numerical statements. By Diagram II, it appears at a glance that the average daily range of temperature at Battle Creek in 1901 was, during July,

DIAGRAM XI.—VELOCITY OF WIND, BY MONTHS, 1901.



greater than at any other of the twelve stations represented in that diagram, and during November was less at Marquette. The marked agreement in the course of lines in Diagram I, representing mean monthly temperature at seven stations, and also that the agreement is closer in November and December than in the other months, appear at once on reference to the diagram. The resemblance between the lines in Diagram I, relating to mean temperature by months in 1901, and those in Diagram III, relating to absolute humidity of the atmosphere for the same periods, is apparent. By Diagram X, it appears that in every month of the year the highest velocity of the wind (on an average for the month) is reached between 12 M. and 2 P. M., and that the lowest velocity occurs in the latter part of the night or in early morning, and that in 1901 at Lansing, the months of most wind were February, March and November. By reference to Diagram XI, it may be seen that at other stations in Michigan where records of actual miles of wind traveled were kept, March was in 1901 the month of greatest wind. These statements illustrate the reading of the diagrams for any use it may be desired to make of the tables and diagrams.

Diagrams XII, XIII, XIV and XV, relating to the direction of the wind, are constructed on a plan different from that of the other diagrams. A description of the plan of their construction, method of reading, etc., is printed on page 62 of the annual report for 1898, and in preceding reports.

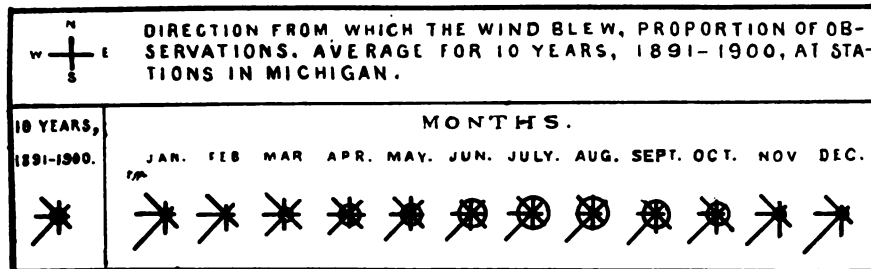
TABLE XXXVI.—DIRECTION OF WIND, 1891-1900.—*Number of observations per month (made tri-daily), at which the wind was blowing from the several (eight) points of compass.—Annual and monthly averages for the 10 years, 1891-1900, at stations in Michigan.**

Points of compass.	Average number of observations per month.—10 years, 1891-1900.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations...	90	92	84	92	89	91	88	91	91	89	92	89	92
Calm.....	5	3	2	4	5	6	7	8	8	7	6	3	3
North.....	7	6	5	8	9	9	6	8	9	7	7	6	4
Northeast.....	8	5	7	11	11	10	9	7	9	7	6	6	5
East.....	6	5	5	8	9	7	7	5	5	5	4	3	3
Southeast.....	9	9	8	11	11	10	10	8	8	10	12	9	7
South.....	10	10	8	8	7	9	8	8	9	10	11	12	12
Southwest.....	21	25	20	16	15	19	20	21	21	22	22	24	29
West.....	12	16	15	12	11	11	11	13	9	10	11	13	15
Northwest.....	13	15	14	15	12	12	9	12	13	12	13	14	13

*At 11 stations in 1891; 11 in 1892; 8 in 1893; 10 in 1894; 9 in 1895; 10 in 1896; 9 in 1897; 8 in 1898; 9 in 1899; in 1900.

Graphic representations of statements made in Table XXXVI, are given in Diagram XIII.

DIAGRAM XIII.—WIND, DIRECTION, IN MICH., AVERAGE 10 YEARS, 1891-1900.



[PLATE 1130]

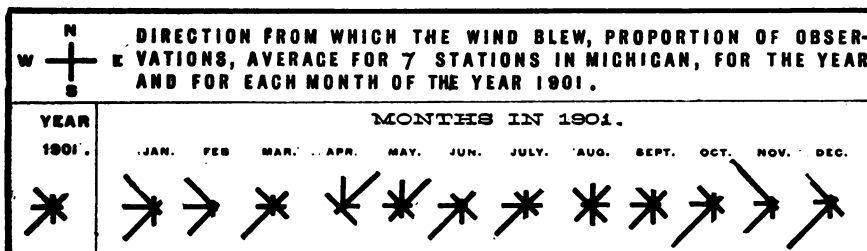
TABLE XXXVII.—Number of observations per month (at 7 A. M., 2 P. M. and 9 P. M., daily), at which the wind was blowing from each of the 8 principal points of compass, during the year and during each month of the year 1901. Average for 7 stations in Michigan.*

Points of compass.	Average number of observations per month, 1901.												
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations } (7 stations)..... }	89	93	80	87	86	93	87	92	93	90	93	90	93
Calm.....	2	1	3	1	1	3	3	2	3	2	3	2	3
North.....	7	5	3	6	16	14	3	7	11	8	6	4	3
Northeast.....	11	5	3	10	27	22	9	13	13	10	6	5	4
East.....	5	2	3	8	9	6	3	9	9	4	2	1	1
Southeast.....	9	5	3	10	13	10	11	8	12	10	7	5	11
South.....	8	11	6	5	3	7	11	8	11	11	11	8	8
Southwest.....	21	25	21	25	5	11	26	23	13	18	33	22	34
West.....	11	17	17	9	2	10	13	13	7	13	14	10	9
Northwest.....	15	22	21	13	10	10	8	8	13	13	12	32	20

*The names of observers, their places of observation, and the counties and divisions of the State in which those places are situated are stated in Table I.

Graphic representations of statements in Table XXXVII are given in Diagram XIV.

DIAGRAM XIV.—WIND, DIRECTION, IN MICH., YEAR AND MONTHS, 1901.



[PLATE 1126]

46 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XXXVIII.—Average number of observations per month for the year 1901, at which the wind was blowing from each of the 8 principal points of the compass, at each of 7 stations* in Michigan; also the average line for the 7 stations.

Stations in Michigan.*	Divisions of the State.†	Average number of observations per month, 1901.									
		All obs.	Calms.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Average for 7 stations.....		90	2	7	11	5	9	8	21	11	15
Traverse City.....	N. W.	87	13	20	6	4	5	13	9	8	8
Harrisville.....	N. E.	91	0	0	14	0	11	0	45	2	19
Thornville.....	B. & E.	91	0	0	13	6	12	5	18	19	20
Lansing, S. B. of H.	C.	91	0	7	11	4	9	13	17	14	17
Ann Arbor.....	S. C.	91	2	6	11	5	7	10	24	12	15
Battle Creek.....	S. C.	85	0	5	11	9	8	9	18	15	9
Tecumseh.....	S. C.	91	1	11	9	6	9	11	18	9	18

*The names of observers, their places of observation, and the counties in which these places are situated are stated in Table I.

†The full names of the divisions and the counties in each division are stated in Exhibit I, in the annual report for 1898 and preceding reports.

Graphic representations of statements in Table XXXVIII, are given in Diagram XV.

DIAGRAM XV.—WIND. DIRECTION. AT STATIONS IN MICHIGAN. 1901.

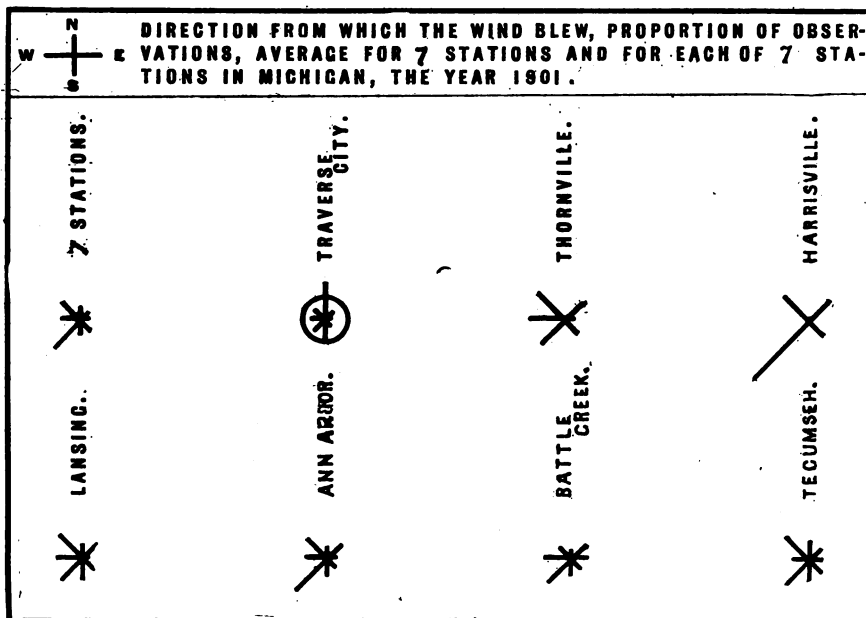


TABLE XXXIX.—Number of observations for months and year 1901, at which the wind was blowing from each of the 8 principal points of the compass, at 7 stations* in Michigan; also average line for 7 of the said stations from which complete, or nearly complete observations were received for the year. (Observations were made at 7 A. M., 2 P. M. and 9 P. M., daily.)

Stations in Michigan.*	Divis- ions of the State.*	January.										February.										March.										
		Total.		N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.		N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.		N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	
		Calm.	93	1	5	2	5	11	25	17	22	Calm.	80	3	3	3	3	6	21	17	21	Calm.	87	1	6	10	8	10	5	35	9	13
Av. 7 stations†																																
Traverse City	N. W.		93	4	12	3	7	4	16	13	16	17	84	19	6	3	7	1	8	9	9	22	93	7	22	8	10	9	5	15	3	14
Harrisville	N. E.		93	0	0	7	0	4	9	57	8	17	84	0	0	3	0	5	0	38	4	34	93	0	1	25	1	11	0	39	3	13
Thornville	B. & E.		93	0	0	0	0	5	7	15	41	25	84	0	2	0	0	2	3	31	29	17	93	0	0	7	7	17	0	23	22	17
Lansing, S. B. of H.	C.		93	0	3	8	2	4	17	18	12	29	84	0	3	6	0	6	9	18	16	26	93	0	3	10	7	16	5	25	7	20
Ann Arbor	S. C.		93	1	7	4	2	5	13	26	14	21	84	2	1	3	0	4	10	29	19	16	93	0	6	8	9	8	10	25	16	11
Battle Creek	S. C.		93	0	3	9	2	3	16	19	23	18	57	0	3	2	9	1	8	1	25	8	51	0	2	3	11	5	6	10	7	7
Tecumseh	S. C.		93	0	7	6	3	7	11	25	8	26	84	2	6	2	4	0	5	20	18	27	93	0	8	10	9	5	10	36	7	8

*Names of observers, etc., are given in Table I. Names of divisions, etc., are given in Exhibit I, in the annual report for 1898 and in preceding reports.

†This line includes the 7 stations from which statements complete, or nearly complete, were received for every month of the year.

Graphic representations of statements for seven lines in this table are given in Diagram XII, which is explained on page 62 of the annual report for 1898, and in preceding reports.

TABLE XXXIX.—CONTINUED.—*Direction of wind, months in 1901.—Observations at which the wind was blowing from direction named.*

Stations in Michigan.*	Divis- ions of the State.*	April.										May.										June.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
		N.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.					N. W.					Total.					Calm.					N.					N. E.					E.					S. E.					S. W.					W.									

*†These foot-notes are at bottom of first page of this table.

Graphic representations of statements for seven lines in this table are given in Diagram XII, which is explained on page 62 of the annual report for 1898, and in preceding reports.

TABLE XXXIX.—CONTINUED.—*Direction of wind, months in 1901.—Observations at which the wind was blowing from direction named.*

Stations in Michigan.*	Divi- sions of the State.*	July.										August.										September.											
		Total.		N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.		Calms.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.		Calms.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
Av. 7 stations*.....		92	2	7	13	9	8	8	23	13	8	93	3	11	13	9	12	11	13	7	13	90	2	8	10	4	10	11	18	13	13		
Traverse City.....	N. W.	88	16	29	6	4	11	5	8	7	2	93	21	28	5	2	6	22	2	3	4	90	11	17	6	4	6	21	10	13	2		
Harrisville.....	N. E.	93	0	0	19	0	10	0	56	0	8	93	0	0	14	0	14	0	52	0	13	90	0	0	15	0	15	0	35	1	24		
Thornville.....	H. & E.	93	0	0	22	6	17	0	24	16	8	93	0	3	22	9	20	4	5	10	20	90	0	0	15	6	14	0	11	23	21		
Lansing S. B. / of H.....	C.	93	0	5	12	9	8	11	26	13	9	93	0	12	14	6	11	14	7	11	18	90	1	9	7	1	8	19	18	15	11		
Ann Arbor.....	S. C.	93	0	2	12	10	4	16	26	9	14	93	1	11	10	18	9	15	8	6	15	90	1	8	10	2	11	7	22	17	12		
Battle Creek.....	S. C.	93	0	9	6	21	3	12	9	28	5	93	1	9	12	23	6	9	6	18	9	89	2	10	4	11	7	16	18	13	8		
Tecumseh.....	S. C.	93	1	7	14	10	4	10	14	20	13	93	1	13	11	6	20	14	10	3	15	90	0	10	16	4	7	17	15	8	13		

*†These foot-notes are at bottom of first page of this table.

Graphic representations of statements for seven lines in this table are given in Diagram XII, which is explained on page 62 of the annual report for 1898, and in preceding reports.

TABLE XXXIX.—CONCLUDED.—*Direction of wind, months in 1901.—Observations at which the wind was blowing from direction named.*

Stations in Michigan.*	Divi- sions of the State. †	October.										November.										December.									
		Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
Av. 7 stations†		93	3	6	6	2	7	11	33	14	12	90	2	4	5	1	5	8	22	10	32	93	3	3	4	1	11	8	34	9	20
Traverse City	N. W.	93	15	15	3	0	4	21	18	9	8	90	12	13	5	3	7	16	10	10	14	93	14	5	0	3	9	25	12	10	15
Harrisville	N. E.	93	0	0	1	0	12	0	61	2	17	90	0	0	5	0	9	0	48	2	26	93	0	0	0	0	13	1	53	3	23
Thornville	B. & E.	93	0	0	13	2	9	2	29	23	15	90	0	0	5	2	3	2	19	13	46	93	0	0	4	0	16	0	23	12	38
Lansing, S. B. of H.	C.	93	0	6	6	2	7	13	22	27	10	90	0	2	8	1	4	11	18	12	34	93	0	4	4	1	13	13	27	14	17
Ann Arbor	S. C.	93	3	3	3	5	3	5	42	12	17	90	3	1	6	0	4	6	22	9	39	93	0	3	7	0	8	8	36	10	21
Battle Creek	S. C.	93	0	2	11	1	11	12	36	16	4	90	0	0	8	1	5	7	29	17	23	93	2	1	7	1	12	3	53	7	7
Tecumseh	S. C.	93	0	13	6	4	2	24	24	6	14	90	0	11	0	0	6	11	9	10	43	93	2	9	5	4	5	8	35	5	20

*† These foot-notes are at bottom of first page of this table.

Diagram XII exhibits lines showing, by months, directions of wind at each of seven stations in this table; for each month and station the diagram represents the figures given in this table for the same month and stations; it is explained on page 62 of the annual report for 1898, and in preceding reports.

DIAGRAM XII.—WIND, DIRECTION, AT STATIONS, BY MONTHS, 1901.

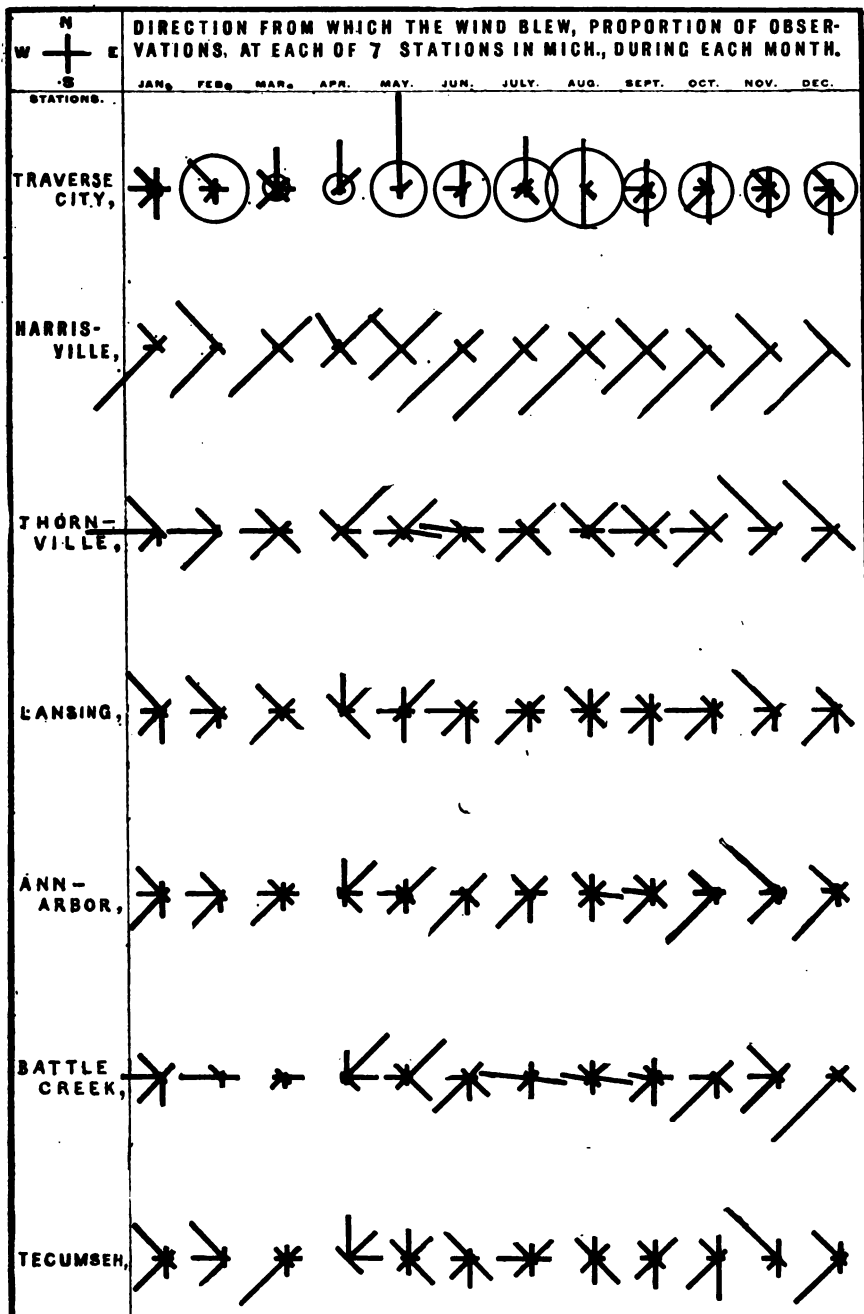


TABLE XL.—Average daily range of atmospheric pressure (as determined from three daily observations) for months and year 1901, at 7 stations, also average line for 7 stations* in Michigan—stations arranged in order by latitude, those farthest north first.

Stations in Michigan.*	Average daily range of barometer.—Year and months, 1901.														
	Norm. †	1900.	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 7 stations..	-----	-----	.177	.280	.194	.229	.173	.159	.101	.103	.097	.159	.187	.215	.229
Traverse City.....	.211 ²⁰	.196	.188	.318	.159	.262	e .149	.187	d .100	c .139	.115	.181	.214	.209	.227
Harrisville.....	.206 ⁷	.199	.192	.308	.178	.253	.158	.168	.121	.118	.108	.170	.230	.226	.263
Thornville.....	.209 ¹⁸	.191	.186	.307	.210	.229	.193	.171	.102	.102	.096	.163	.204	.221	.231
Lansing, S. B. of H.	.201 ²⁰	.190	.178	.307	.210	.250	.183	.156	.110	.103	.103	b .160	.096	.218	.236
Battle Creek.....	.142 ³ⁱ	.141	.147	.176	.168	f .142	.167	.130	.078	.070	.066	b .133	.186	.231	.218
Ann Arbor.....	.203 ^{30j}	.192	.186	.289	.244	.237	.193	.153	.108	.105	.106	.160	.196	.212	.232
Tecumseh.....	-----	-----	.164	.255	.189	.230	.169	.146	.087	.082	.086	.149	.181	.191	a .197

*The names of observers, their places of observation, and the counties in which these places are situated are stated in Table I. The average atmospheric pressure at each of these stations, by months, in 1901, is given in Table XLIII.

†Numbers in this column state the average daily range of atmospheric pressure for periods of years ending in each case with Dec. 31, 1901. The small figures above and at the right of numbers which state the average daily range denote the number of years included in the average.

a For 30 days. b For 28 days. c For 27 days. d For 23 days. e For 21 days. f For 18 days. g For 16 days.

NOTE.—The latitude and elevations of some of the stations in Table XL, are stated in Table II.

The daily range is found by subtracting the lowest observation from the highest observation, 7 A. M. to 7 A. M.

Foot-notes to Table XLI.

*Numbers in this column state the average monthly range of atmospheric pressure for a period of years ending in each case with December 31, 1901. The small figures above and at the right of the numbers which state the average denote the number of years included in the average.

†Represents the difference between the highest of 6 stations and the lowest of 6 stations for year and for each month of year, not including Battle Creek.

‡Represents sum of ranges at 6 stations divided by 6.

§The average for 11 months is .702.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 29 days. b For 27 days. c For 23 days. d For 21 days. e For 19 days.

NOTE.—The statements in the (*) foot-note to Table XL, apply also to Table XLI.

TABLE XLI.—Range of atmospheric pressure (as determined from three daily observations) for the year and for each month and for the average month of the year 1901, at 6 and at each of the 6 stations, and average line for 6 stations in Michigan; also the normal—average monthly range for a series of years. Stations named in order by latitude, those farthest north first.

Stations in Michigan.	Range of barometer.—Year and months, 1901.															
	Norm. #	1900.	1901.	Av. Month.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
For 6 stations†	-----	-----	1.711	1.258	1.711	1.276	1.231	1.433	1.406	.928	.847	.765	1.286	1.468	1.517	1.231
Av. for 6 stations‡	-----	-----	1.396	.810	1.316	.883	.931	.968	.798	.502	.490	.438	.742	1.006	.928	.883
Traverse City	.942 ³⁰	1.467	1.527	.887	1.439	.839	1.064	.941	1.089	.464	.542	.455	1.011	.965	.877	.961
Harrisville....	.890 ⁷	1.332	1.541	.817	1.421	.851	1.081	.817	.776	.664	.582	.458	.147	.995	1.078	.929
Thornville....	.922 ¹⁸	1.288	1.308	.829	1.308	.883	.774	1.007	1.001	.567	.442	.411	.853	1.065	.873	.820
Lansing, S. B. of H. }	.886 ²⁰	1.286	1.415	.751	1.305	.941	.965	1.009	.648	.459	.449	.448	.826 ^a	1.114	.952	.891
Battle Creek	-----	.956	-----	.8	.934	.708	-----	.913	.573	.348	.295	.270	.613	.966	1.202	.904
Ann Arbor...	.893 ²⁰	1.247	1.369	.828	1.254	.972	.913	1.047	.639	.481	.483	.474	.837	1.100	.887	.848
Tecumseh	-----	-----	1.217	.749	1.171	.812	.790	.987	.632	.434	.443	.384	.780	.799	.899	.851

Foot-notes at bottom of page 52.

TABLE XLII.—Average atmospheric pressure, by year and months, in 1901, compared with annual and monthly averages for 1900, and for the 24 years, 1877-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Average atmospheric pressure.—Inches of mercury.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 24 years, 1877- 1900.....	29.133	29.145	29.143	29.129	29.126	29.093	29.098	29.113	29.133	29.173	29.159	29.146	29.140
1900 (8 stations)....	29.154	29.106	29.080	29.169	29.190	29.119	29.127	29.123	29.181	29.202	29.253	29.147	29.150
1901 (8 stations)....	29.134	29.109	29.132	28.980	29.240	29.044	29.116	29.122	29.171	29.200	29.198	29.182	29.110
In 1901 greater than av. for 24 years, 1877-1900....	.001	-----	-----	-----	.114	-----	.018	.009	.038	.027	.039	.036	-----
In 1901 less than av. for 24 years, 1877-1900.....	-----	.036	.011	.149	-----	.049	-----	-----	-----	-----	-----	-----	.030
In 1901 greater than in 1900.....	-----	.003	.052	-----	.050	-----	-----	-----	-----	-----	-----	.035	-----
In 1901 less than in 1900.....	.020	-----	-----	.189	-----	.075	.011	.001	.010	.002	.055	-----	.040

*At from 7 to 20 stations per year for the 24 years, 1877-1900. Just which stations in each year, up to 1897, are shown on page 75, report for 1898.

TABLE XLIII.—Average atmospheric pressure for months and year 1901, at each of 8 stations in Michigan; also averages for 8 stations; as indicated by the height, in inches, of Mercury in the barometer. Corrected for temperature.—Reduced to 32° F. (for some stations; not corrected for instrumental errors).—Average of observations made daily at 7 A. M., 2 P. M. and 9 P. M. by observer† for the State Board of Health.

Stations in Michigan.†	Divisions of the State.‡	Inches of Mercury.—Atmospheric pressure.													
		Years.		Months, 1901.											
		Norm.§	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 stations¶			29.134	29.109	29.132	29.080	29.240	29.044	29.116	29.122	29.171	29.200	29.198	29.182	29.110
Traverse City.....	N. W.	29.322 ²⁰	29.320	29.283	29.302	29.144	29.401	29.253	29.277	29.289	29.353	29.367	29.397	29.385	29.296
Harrisville.....	N. E.	29.324 ¹	29.307	29.270	29.292	29.163	29.436	29.221	29.262	29.281	29.340	29.349	29.374	29.365	29.336
Thornville.....	B. & E.	28.955 ²²	28.948	28.901	28.921	28.779	29.088	28.857	28.931	28.936	28.995	29.021	29.034	29.011	28.948
Agricultural College.....	C.	29.060 ²⁰	29.065	29.038	29.055	28.888	29.151	28.954	29.036	29.044	29.093	29.122	29.156	29.155	29.086
Lansing, S. B. of H.....	C.	29.064 ²³	29.064	29.034	29.049	28.882	29.152	28.959	29.042	29.053	29.106	29.127	29.161	29.146	29.062
Ann Arbor.....	S. C.	29.034 ²¹	29.023	28.995	29.012	28.876	29.096	28.905	29.002	29.009	29.055	29.082	29.122	29.097	29.022
Battle Creek.....	S. C.	29.303 ³	29.221	29.248	29.305	29.151	29.383	29.211	29.277	29.290	29.285	29.343 ^a	29.102	29.091	28.999
Tecumseh.....	S. C.		29.122	29.105	29.122	28.955	29.173	28.991	29.100	29.107	29.144	29.187	29.241	29.203	29.130

*A correction has been made for instrumental error of barometer at Ann Arbor: .004 has been added to each monthly average during the year 1901. At the Agricultural College, —.013 has been subtracted from each monthly average. For other stations the instrumental error of barometer is not known.

†The names of observers, their places of observation, and the counties in which these places are situated are stated in Table I.

‡The full names of divisions and the counties in each division are stated in Exhibit 1, in the annual report for 1898 and preceding reports.

§Numbers in this column state the average annual atmospheric pressure for periods of years ending in each case with December 31, 1901. The small figures at the right of the numbers state the average denote the number of years included in the average.

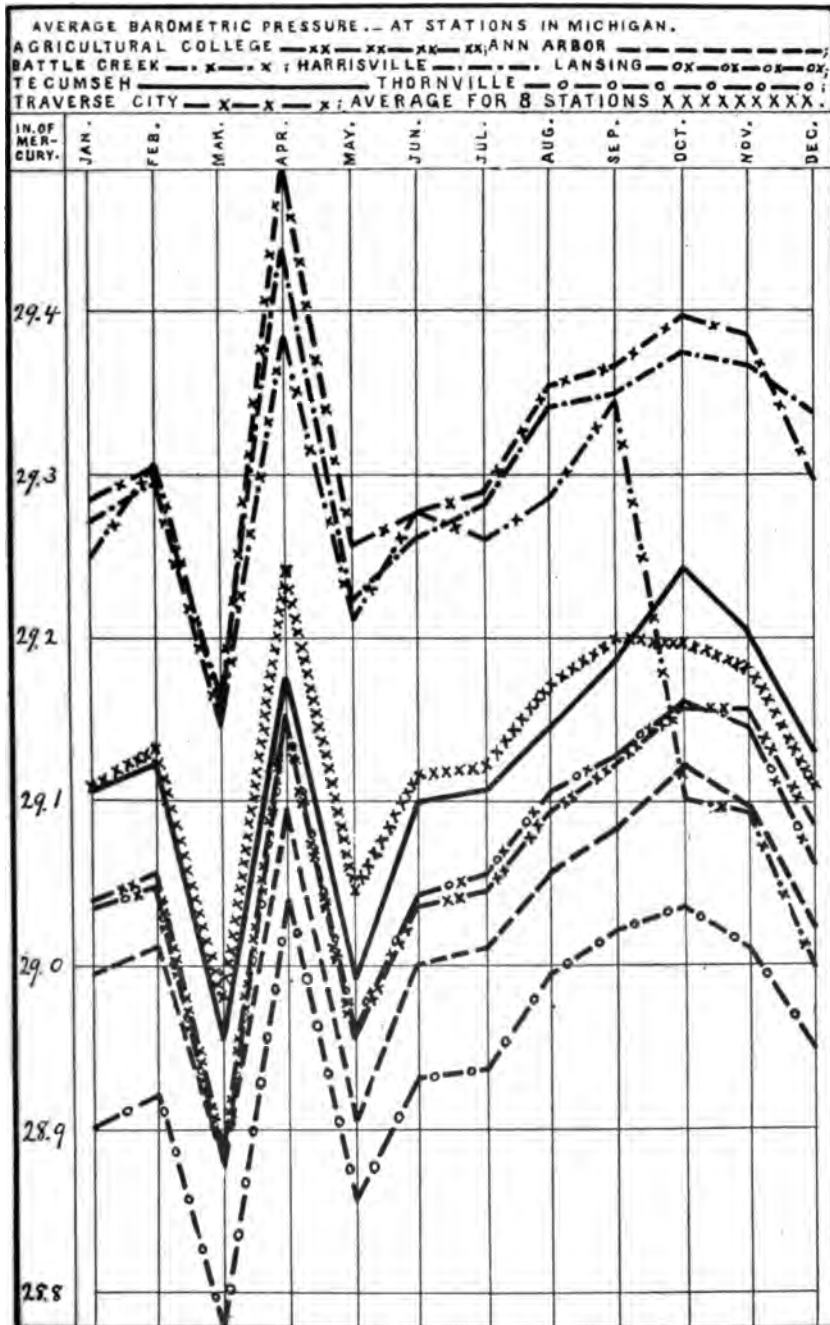
¶This line is an average for eight stations, at which observations, nearly complete, were received for every month in the year. Green's standard barometer was used at all the 8 stations for 1901.

NOTE.—Computations of monthly averages for the year 1901 were furnished by the observers at Ann Arbor and the Agricultural College. The remainder of the computations were made at the office of the State Board of Health.

a For 20 days. b For 27 days. c For 23 days. d For 21 days. e For 19 days. f For 16 days.

The average line and lines for eight stations in this table are graphically represented in Diagram XVI.

DIAGRAM XVI.—ATMOSPHERIC PRESSURE, BY MONTHS, 1901.



[PLATE 1128]

56 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE XLIV.—Average daily range of atmospheric pressure, by year and months, in 1901, compared with annual and monthly averages for 1900, and for the 19 years, 1882-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Average daily range of barometer.—Year and months, 1901.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 19 yrs., 1882-1900	.208	.298	.292	.266	.209	.164	.138	.125	.128	.169	.201	.248	.262
1900 (7 stations)....	.190	.261	.280	.291	.186	.137	.169	.130	.082	.173	.148	.216	.205
1901 (7 stations)....	.177	.280	.194	.229	.173	.159	.101	.103	.097	.159	.187	.215	.229
In 1901 greater than av. for 19 years, 1882-1900...	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
In 1901 less than av. for 19 years, 1882-1900.....	.031	.018	.098	.037	.136	.005	.037	.022	.031	.010	.014	.033	.033
In 1901 greater than in 1900.....	-----	.019	-----	-----	-----	.022	-----	-----	.015	-----	.039	-----	.024
In 1901 less than in 1900.....	.013	-----	.086	.062	.013	-----	.068	.027	-----	.014	-----	.001	-----

*At from 7 to 18 stations per year for the nineteen years, 1882-1900. Just which stations in each year, up to 1897, are shown on page 78, report for 1898.

TABLE XLV.—Range of atmospheric pressure, by year and months, in 1901, compared with annual and monthly averages for 1900, and for the 19 years, 1882-1900.* These averages are for groups of several stations in Michigan.

Years, etc.	Range of barometer.—Year and months, 1901.												
	Annual av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 19 yrs., 1882-1900	.935	1.254	1.263	1.172	1.001	.775	.689	.574	.595	.799	.961	1.094	1.122
1900 (7 stations)....	.813	.973	1.165	1.183	.778	.536	.619	.598	.456	.768	.587	1.075	1.017
1901 (6 stations)....	.810	1.316	.883	.931	.968	.798	.502	.490	.438	.742	1.006	.928	.883
In 1901 greater than av. for 19 years, 1882-1900...	.....	.062	.....	.....	.....	.023	.....	.....	.....	.....	.045	.....	.....
In 1901 less than av. for 19 years, 1882-1900.....	.125	.....	.380	.241	.033	.....	.187	.084	.157	.057	.....	.166	.239
In 1901 greater than in 1900.....	.....	.343	.....	.....	.190	.262	.....	.....	.....	.....	.419	.....	.....
In 1901 less than in 1900.....	.003	.....	.282	.252	.....	.....	.117	.108	.018	.026	.....	.147	.134

*At from 6 to 18 stations per year for the nineteen years, 1882-1900. Just which stations in each year, up to 1897, are shown on page 78, report for 1898.

Sunshine and clouds.—On the back of each blank register supplied by this Board to observers, on which they are to register meteorological data, is a statement that "One observer has reported a record of days 'all or nearly all cloudy' and days 'all or nearly all sunshine.' The State Board of Health would be glad to have such a report from all observers who can conveniently make it. Memoranda may be made in a column headed 'cloudy or sunny,' days more than eighty per cent of clouds being marked with the abbreviation 'C,' indicating *cloudy*, and days with less than 20 per cent of clouds with an 'S,' indicating *sunshine*."

TABLE XLVI.—*Statements of the number of days in each month which were reported "sunny," "partly cloudy," and "cloudy," by observers at stations in Michigan.*

Stations in Michigan.	1901.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Marquette.....	S. 4 P. C. 5 C. 22	5 9 14	4 8 19	12 8 10	10 10 11	7 11 12	7 11 13	17 8 6	6 7 17	5 15 11	1 9 20	2 7 22	
Sault Ste. Marie.	S. 3 P. C. 10 C. 18	7 11 10	8 8 15	13 8 9	8 13 10	10 14 6	12 11 8	16 9 6	8 11 11	5 7 19	3 3 24	5 3 23	
Traverse City....	S. 1 P. C. 2 C. 28	3 11 14	----- ----- -----	12 8 7	8 7 14	13 16 1	12 4 15	14 8 9	9 8 13	6 6 19	2 2 26	2 2 27	
Alpena.....	S. 6 P. C. 4 C. 21	7 7 14	6 4 21	9 3 18	6 7 18	11 8 11	12 9 10	13 6 12	8 11 11	6 11 14	2 5 23	1 7 23	
Grand Haven.....	S. 2 P. C. 4 C. 25	5 6 17	5 8 18	12 6 12	7 8 16	12 14 4	15 12 4	13 8 10	13 9 8	11 11 9	4 6 20	1 7 23	
Port Huron.....	S. 7 P. C. 2 C. 22	10 6 12	7 5 19	14 4 12	6 11 14	16 13 1	9 12 10	9 10 12	11 12 7	12 15 4	5 9 16	4 13 14	
Thornville.....	S. 4 P. C. 7 C. 20	8 3 17	9 5 17	12 7 11	12 6 13	14 10 6	18 9 4	14 8 9	----- ----- -----	20 7 4	9 3 18	9 2 20	
Lansing.....	S. 4 P. C. 4 C. 23	5 2 21	8 0 23	10 2 18	6 1 24	11 7 12	18 2 11	10 5 16	13 7 10	12 5 14	5 6 19	7 7 17	
Ann Arbor.....	S. 6 P. C. 2 C. 23	4 7 17	4 6 21	10 6 14	6 9 16	16 11 3	14 9 8	9 11 11	16 7 7	15 9 7	4 8 18	4 9 18	
Battle Creek....	S. 6 P. C. 7 C. 18	----- ----- -----	----- ----- -----	7 10 13	4 13 14	2 23 5	2 11 18	0 14 17	----- ----- -----	6 12 13	2 7 21	1 16 14	
Detroit.....	S. 6 P. C. 2 C. 23	7 7 14	6 6 19	10 7 13	5 16 10	9 13 8	18 10 3	10 15 6	13 13 4	16 12 3	5 11 14	8 6 17	

THE TIME OF GREATEST PREVALENCE OF EACH DISEASE.

CONTRIBUTIONS TO THE STUDY OF THE CAUSES OF SICKNESS.

A STATISTICAL REPORT BASED ON WEEKLY POSTAL-CARD REPORTS OF SICKNESS IN MICHIGAN DURING THE YEAR 1901, AND COMPARISONS WITH PRECEDING YEARS.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD OF HEALTH.

This paper is the twenty-fifth in a series of articles upon the same general subject begun in the latter part of 1876. It presents a summary of the compilation of weekly reports of sickness in Michigan in 1901. It includes a series of graphic illustrations which show by months, in 1901, the rise and fall of twenty-eight of the most prominent diseases in Michigan.

One of the objects of this compilation is to learn the time of the greatest and of the least prevalence of each of the more important diseases in the State, and to note the connection of this prevalence with each of the meteorological conditions in the State.

Tables are given showing the per cent of the weekly *reports* and the per cent of *observers* which stated the presence of the various diseases; and by comparing Table 1 with Table 4, we see the correspondence in the two lines of evidence,—that of the “prevalence” of the diseases as shown by the per cent of *reports*, and the “area of prevalence” as shown by the per cent of *observers*, the diseases following each other in a somewhat similar order from highest to lowest—the diseases being arranged in each table in the order of their greatest reported prevalence in 1901.

For purposes of comparison of the sickness from the several diseases in the year under consideration with that in preceding years, some of the tables exhibit the facts relative to the sickness in Michigan from each of the important diseases in each of several preceding years, and some of the tables permit of quantitative comparisons of the latest year with the averages of the ten preceding years.

Propositions are stated as to the relations of specified meteorological conditions, and diseases are mentioned under these propositions in such manner as to suggest one method of studying some of the facts brought out in the compilation. Casual observation shows that certain diseases are much more prevalent in the hot months, while certain other diseases

are much more prevalent in the cold months. The relation between these diseases and the atmospheric temperature is well marked, but accurate statistics are needed to show just what that relation is. We find, also, that other meteorological conditions than atmospheric temperature have a marked effect upon many of the diseases, apparently diminishing the effect of temperature in some instances, increasing its effect in other instances. For these reasons the State Board of Health undertakes, by a compilation of the weekly reports of sickness in connection with the various meteorological conditions, to learn what constant, and, therefore, probably causal relations exist between the humidity of the air, the ozone, the velocity of the wind, the atmospheric pressure, etc., and the increased or diminished prevalence of each disease in certain months as compared with other months in the same year, or with the same month in other years or series of years.

To facilitate the study of the causes of sickness and deaths, the State is divided into eleven geographical divisions, the counties in each of which were indicated by lines on maps of the State, on pages 201 and 217 of the report of this Board for 1886.

Physicians should have compensation for weekly reports of sickness.—Great credit is due the busy medical practitioners in Michigan who forward these reports of sickness. Some of them have made the reports regularly since this plan was adopted in 1876. The service is, as a rule, without compensation; a few health officers have slight pay from their local boards of health. Each one should have full compensation. No other class of persons has knowledge of the facts that are necessary in the compilation of health statistics; and it is greatly to the credit of physicians that they are so willing to coöperate in every effort made to advance the public health.

Plan of the weekly card reports.—The plan of the weekly reports remains the same as last year. (Cards having *pleuritis* printed on them were first used for weekly reports in October, 1887.) Observers now report only the diseases under their own personal observation. Previous to the year 1885, some of the observers reported such diseases as they believed to be present in their locality, even though not under their own observation. Details of the method of securing and the plan of marking these reports may be thus stated:—

The blanks for the weekly reports are printed on postal cards, which are supplied to the observers of diseases. Blank record books in which to preserve copies of the reports, remarks, etc., are also supplied to these observers, to be retained by them. The reports are forwarded weekly to the Secretary of the State Board of Health at Lansing.

The plan of making the report is as follows: Each observer is requested to mark the disease of which there was the greatest number of cases under his observation during the week for which the report is made, 1; that of which there was the next greatest number of cases, 2; the next, 3; and so on, applying *consecutive* numbers to the diseases reported present; but marking with the *same* figure all diseases of which there is the same number of cases; to write 0 opposite each disease mentioned of which there was no case; to apply these numbers without regard to the severity of the cases; to include all cases, without regard to when they were taken sick, so long as they are actually sick with the given disease; to include all cases "under the observation" of the observer. A blank is left on the card for the convenience of those observers who prefer to state the number of cases rather than the order of prevalence by the foregoing method.

To illustrate the method of making the reports, the following copy of one of the blanks now in use is given, correctly marked, in the "prevalence" column, for the number of cases stated on the right-hand margin. It should be remembered that the numbers in the "prevalence" column denote simply the relative order in which the several diseases appear to be prevalent, and do not denote a definite number of cases; so that a disease might one week be marked 4, and the following week, with the same number of cases, be marked 1. Names of diseases printed in *italics* are not *printed* on the postal blanks, but are supposed to have been *written* on the report by the observer.

[Ed. 49] **REPORT** of diseases under the observation of representative physicians in active general practice.

Diseases in.....and vicinity,
week ending Sat.,....., 190...

	DISEASES.	CASES OBSERVED.	
		Order a	No. of Cases.
<p>1. If you do not state the number of cases, please mark the disease of which there is the greatest number of cases. 1. In the order column, the disease having next greatest number of cases, 2. the next, 3. and so on for each disease, writing the same figures opposite diseases having the same number of cases. Write opposite each disease of which there is no case under your observation. [Full statement of plan on second, third, and fourth pages of record-book cover]. A blank indicates that the item has been overlooked. Please mail this signed and dated, as soon as convenient after close of week.</p> <p>REMARKS: If this report includes a communicable disease, please write, below, the township, city, or village in which the disease is.</p>	Brain, Inflammation of.....	14	1
	Bowels, Inflammation of....	12	3
	Bronchitis.....	11	4
	Cerebro-Spinal Meningitis...	0	0
	Cholera Infantum.....	8	9
	Cholera Morbus.....	10	6
	Consumption, Pulmonary.....	10	6
	Croup, Membranous.....	12	3
	Diphtheria.....	5	14
	Diarrhea.....	3	17
	Dysentery.....	8	9
	Erysipelas.....	13	2
	Fever, Intermittent.....	2	21
	Fever, Remittent.....	11	4
	Fever, Typhoid (Enteric)...	0	0
	Fever, Typho-malarial.....	9	7
	Influenza.....	7	11
	Kidney, Inflammation of....	14	1
	Measles.....	1	27
	Neuralgia.....	14	1
	Pleuritis.....	0	0
	Pneumonia.....	9	7
	Puerperal Fever.....	0	0
	Rheumatism.....	6	12
	Scarlet Fever.....	4	16
	Smallpox.....	0	0
	Tonsillitis.....	11	4
	Whooping-cough.....	0	0
	Mumps.....	6	12
	Dyspepsia.....	11	4

.....M. D.

Bulletins of "Health in Michigan."—During the year 1901 the issue of the weekly and monthly bulletins of "Health in Michigan" has been continued. These bulletins are compiled from the regular weekly card reports of physicians in all parts of the State, and from the health officers' reports of communicable diseases, which reports, excepting those weekly card reports made by voluntary observers, are made to the Secretary of the State Board of Health in compliance with law.

The bulletins give to the members of the State Board of Health, local health officers, and when published to the public, information concerning the "diseases which cause most sickness" in the State, the relative amount of sickness from each disease, and comparisons with the preceding week or month, thus showing any sudden increase or decrease which may have occurred in the prevalence of any disease, together with a comparison of the various meteorological conditions; also a comparison with the average week or month for a series of years; also (in the weekly bulletin) a list of the localities in which smallpox was reported present, which

lists, if widely published, would serve to put people intending to visit such places on their guard against the disease.

As a rule, about five-eighths of the card reports reach the office of the State Board of Health in time for compilation in the weekly bulletin, and the monthly bulletins are compiled from the information used in the weekly bulletins. It is found that the statements made in the monthly bulletins are corroborated by the information, after the close of the year, from the compilation of the whole number of the reports for the corresponding months of the year.

The bulletins are an immediate ephemeral use of some of the data supplied by the reports from localities, which data finally go to make up the permanently-valuable sickness statistics, and the communicable-disease statistics in Michigan; but even this ephemeral use has been the means of disseminating among the people of Michigan much information useful for the restriction and prevention of sickness and deaths.

A copy of the weekly bulletin has been sent to such editors as have expressed a desire to have it for use, entire or in part, in their papers; and copies of the monthly bulletin have been sent to the sanitary and medical journals which are received as exchanges by the library of the State Board of Health.

There are about 1,595 cities, villages and townships in Michigan, each of which is required by law to have a health officer, and nearly every one of them contributes some fact, and some of them very many facts, useful for the promotion of the public health. The State Board of Health serves to collect these facts, group them so as to make them most useful, and give them all out again to every locality for the general good.

Annual compilation of the weekly reports.—The reports from each locality are compiled by months. The average of the numbers stating the order of prevalence of the several diseases for the month is considered an indication of the actual order of prevalence of the diseases for that time. There is also found for each locality what per cent of the reports states the presence of each disease for the given month. This per cent of reports for a single locality indicates what portion of the month the disease was present in that locality. It may also be called the per cent of weeks the disease was present. These first results of the compilation are stated in Table 3, which, on account of the space required, has not been printed in the reports since that of 1882, but is preserved in the office of the State Board for reference and study.

A combination of the statements for localities in Table 3 is made by months for the State, so far as it is represented by the localities from which reports are received, showing: (1) What per cent of the observers reported each disease each month; (2) for the localities at which a given disease was reported, an average of the per cent of weeks it was reported at those localities; (3) what per cent of all the reports received for the month stated the presence of each disease; (4) an average of the numbers denoting the order of prevalence of each disease at the localities at which it was reported present during the month.

Diseases from which there was a marked increase or decrease in prevalence in Michigan in 1901.—By referring to Tables 13 and 14, on subsequent pages, it will be seen that the diseases which showed a marked increase in 1901 over the average for the ten years, 1891-1900, are scarlet

fever, smallpox and typhoid fever; the diseases in which the decrease in 1901 appears most marked, when compared with the above-mentioned average, are intermittent fever, remittent fever, diphtheria, consumption, erysipelas, whooping-cough, membranous croup, measles, cholera infantum, cholera morbus, dysentery and inflammation of brain.

The lessened prevalence, in recent years, of some of the dangerous communicable diseases, as shown in the diagrams on pages 3 and 4 of the annual report of this Board for 1901; is undoubtedly due to the persistent efforts of the State Board of Health, with the coöperation of local health officers in the State, for the education of the people in the prompt and thorough isolation of infected persons and those who may have been exposed to a dangerous communicable disease, and the subsequent disinfection, after recovery, or death, of all infected articles.

Method of comparison of diseases by years, months, and weeks.—In the annual reports ending with that for 1888, mention was made of diseases in which a difference of seven or more was shown between the per cents of reports stating the presence of the disease in the current year and in the preceding year or term of years; in the reports since that for 1888 those diseases were mentioned of which the comparison showed an increase or decrease of twenty-five per cent from the preceding year, or from the normal, as the case may be.

In this report, those diseases which are reported by seven or more observers, and which show an increase or decrease of twenty-five per cent, are generally mentioned, except in cases of cholera, smallpox, typhus fever or other particularly interesting or dangerous disease, and these are specially considered in each instance.

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1901. 63

TABLE 1.—*Stating, for each of 11 years, 1891-1901, the number of reports received, and on what per cent of these reports each of 28 diseases was stated to be present; also an average for the period of 10 years, 1891-1900. The diseases are arranged in the order of greatest area of prevalence in 1901. (Continued for each month of 1900 and 1901 on the two pages following.)*

Line number.	Diseases.	What per cent of the reports stated the presence of the disease.											
		Av. 1891- 1900.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.
	Av. Disease*.....	19	18	18	17	17	18	18	20	20	20	21	25
1	Rheumatism.....	63	61	63	63	62	66	60	60	62	64	64	69
2	Neuralgia.....	57	57	56	56	54	58	54	56	56	57	61	66
3	Bronchitis.....	52	50	49	50	49	50	51	52	50	53	54	60
4	Tonsillitis.....	45	46	45	42	40	43	45	43	42	49	48	49
5	Influenza.....	44	44	40	42	45	47	44	44	41	43	42	55
6	Diarrhea.....	39	36	40	37	36	34	34	42	40	40	43	47
7	Consumption, pul.....	30	22	25	22	20	20	23	29	36	38	38	49
8	Pneumonia.....	20	20	16	17	17	19	18	21	20	22	25	27
9	Inflam. of kidney.....	18	20	20	19	17	17	16	20	17	17	21	20
10	Pleuritis.....	16	17	16	16	15	18	16	17	13	14	18	21
11	Scarlet fever.....	9	14	12	8	5	4	8	12	14	10	12	9
12	Intermittent fever.....	22	14	16	17	19	17	35	22	24	24	27	36
13	Typhoid fever (ent.).....	10	13	15	9	8	7	10	13	11	9	9	11
14	Cholera morbus.....	13	10	14	10	12	10	11	15	14	14	15	16
15	Inflam. of bowels.....	12	9	11	10	10	10	10	11	13	12	13	15
16	Erysipelas.....	13	9	10	10	12	14	12	13	13	14	16	19
17	Dysentery.....	14	9	14	13	12	12	11	15	14	13	15	16
18	Remittent fever.....	17	9	11	12	13	11	16	20	20	18	21	28
19	Cholera infantum.....	10	7	12	8	8	8	8	12	12	10	11	13
20	Smallpox.....	7	7	1	.4	.04	.05	.4	.3	.6	.3	.02	0
21	Measles.....	8	5	13	6	7	13	7	4	6	7	4	10
22	Diphtheria.....	5	5	4	3	3	5	5	5	7	7	7	6
23	Whooping-cough.....	8	5	5	4	5	4	7	9	12	9	10	9
24	Puerperal fever.....	2	2	2	2	2	2	2	2	2	3	4	3
25	Typho-mal fever.....	3	1	3	1	2	.9	2	4	4	4	5	6
26	Meningitis.....	2	1	1	3	2	1	1	.8	1	2	2	3
27	Inflam. of brain.....	3	.9	1	2	2	2	3	3	3	3	3	4
28	Membran. croup.....	2	.4	.4	.6	.5	.7	1	2	2	2	3	4
No. of reports received.....		14,561	5,850	5,513	5,126	5,219	4,418	3,940	4,395	5,572	5,853	5,281	4,291

*The numbers opposite the names of the diseases do not state what per cent of the whole number of reports for the year stated the disease to be present at some time during the year, but state (on an average for twelve months of the year) what per cent of reports for the several months stated the disease to be present in those months. The column for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the reports for that month (the number of which is stated at the foot of the column) stated the given disease to be present in that month.

† Average per year.

TABLE 1.—CONTINUED.—*Stating for each of 28 diseases by months, on what per cent and 1901; also the average by months*

Line number.	What per cent of the reports received stated presence of the disease.											
	January.				February.				March.			
	Diseases.				Diseases.				Diseases.			
	A.V. 1891-1900.	1901.†	1900.		A.V. 1891-1900.	1901.†	1900.		A.V. 1891-1900.	1901.†	1900.	
	Average disease*...	20	19	18	Average disease*...	20	19	19	Average disease*...	21	20	19
1	Influenza.....	72	74	60	Influenza.....	75	83	64	Influenza.....	74	76	65
2	Rheumatism.....	67	63	68	Rheumatism.....	66	64	66	Neuralgia.....	66	67	62
3	Neuralgia.....	63	63	57	Neuralgia.....	64	63	60	Rheumatism.....	69	66	71
4	Bronchitis.....	65	58	57	Bronchitis.....	65	59	64	Bronchitis.....	64	63	65
5	Tonsillitis.....	56	53	54	Tonsillitis.....	55	56	54	Tonsillitis.....	54	54	55
6	Pneumonia.....	38	30	26	Pneumonia.....	39	39	33	Pneumonia.....	36	37	33
7	Consumption, pul.....	31	22	27	Pleuritis.....	24	27	24	Consumption, pul.....	31	25	22
8	Typhoid fever (ent.).....	6	20	6	Consumption, pul.....	30	25	26	Inflam. of kidney.....	20	24	22
9	Inflam. of kidney.....	20	19	23	Inflam. of kidney.....	20	23	22	Pleuritis.....	24	23	23
10	Pleuritis.....	24	19	21	Scarlet fever.....	10	20	13	Diarrhea.....	24	21	19
11	Diarrhea.....	24	18	20	Diarrhea.....	22	14	15	Scarlet fever.....	10	18	9
12	Scarlet fever.....	12	13	16	Erysipelas.....	16	13	11	Erysipelas.....	16	13	11
13	Intermittent fever.....	17	12	12	Typhoid fever (ent.).....	5	10	5	Intermittent fever.....	17	12	12
14	Erysipelas.....	15	10	13	Inflam. of bowels.....	9	8	8	Typhoid fever (ent.).....	4	9	5
15	Inflam. of bowels.....	9	9	9	Intermittent fever.....	16	7	12	Inflam. of bowels.....	10	7	8
16	Remittent fever.....	14	7	9	Smallpox.....	13	6	0	Remittent fever.....	12	6	1
17	Smallpox.....	2	6	0	Remittent fever.....	13	5	7	Smallpox.....	8	6	3
18	Diphtheria.....	5	4	3	Diphtheria.....	5	4	2	Measles.....	13	5	31
19	Dysentery.....	7	4	4	Whooping-cough.....	6	4	5	Whooping-cough.....	6	5	5
20	Measles.....	2	3	15	Dysentery.....	4	3	3	Diphtheria.....	5	4	2
21	Typho-mal fever.....	2	3	3	Measles.....	2	3	19	Puerperal fever.....	3	4	2
22	Cholera morbus.....	3	3	3	Cholera morbus.....	3	3	1	Dysentery.....	5	5	2
23	Meningitis.....	1	1	1	Typho-mal fever.....	1	2	2	Cholera morbus.....	3	3	2
24	Inflam. of brain.....	7	7	1	Puerperal fever.....	3	2	1	Meningitis.....	1	1	1
25	Whooping-cough.....	7	7	1	Inflam. of brain.....	1	1	1	Inflam. of brain.....	1	1	1
26	Puerperal fever.....	3	1	1	Meningitis.....	1	2	2	Typho-mal fever.....	1	1	1
27	Membran. croup.....	3	1	1	Cholera infantum.....	1	1	1	Cholera infantum.....	1	1	1
28	Cholera infantum.....	1	1	1	Membran. croup.....	3	4	2	Membran. croup.....	1	1	1
	Reports received†.....	405	587	481	Reports received†.....	377	474	409	Reports received†.....	410	450	375
	April.				May.				June.			
	Diseases.				Diseases.				Diseases.			
	A.V. 1891-1900.	1901.†	1900.		A.V. 1891-1900.	1901.†	1900.		A.V. 1891-1900.	1901.†	1900.	
	Average disease*...	20	19	19	Average disease*...	18	17	18	Average disease*...	17	16	16
1	Neuralgia.....	63	67	62	Rheumatism.....	66	65	68	Rheumatism.....	62	59	67
2	Rheumatism.....	69	63	66	Neuralgia.....	59	61	61	Neuralgia.....	54	55	53
3	Influenza.....	64	63	63	Bronchitis.....	52	52	53	Bronchitis.....	43	47	41
4	Bronchitis.....	63	60	63	Tonsillitis.....	45	48	47	Tonsillitis.....	36	41	41
5	Tonsillitis.....	52	55	52	Influenza.....	43	43	44	Diarrhea.....	36	35	36
6	Pneumonia.....	31	32	25	Diarrhea.....	27	30	25	Influenza.....	27	28	29
7	Consumption, pul.....	33	26	20	Pneumonia.....	21	24	19	Inflam. of kidney.....	19	21	21
8	Diarrhea.....	26	24	24	Inflam. of kidney.....	21	23	24	Consumption, pul.....	30	20	26
9	Pleuritis.....	22	23	22	Consumption, pul.....	31	22	23	Pneumonia.....	11	16	7
10	Inflam. of kidney.....	22	22	23	Pleuritis.....	18	19	29	Pleuritis.....	13	15	15
11	Erysipelas.....	16	15	10	Intermittent fever.....	22	15	15	Intermittent fever.....	23	15	15
12	Intermittent fever.....	21	14	13	Scarlet fever.....	10	13	11	Scarlet fever.....	9	12	11
13	Scarlet fever.....	12	14	12	Erysipelas.....	15	12	11	Smallpox.....	4	10	2
14	Typhoid fever (ent.).....	4	10	6	Remittent fever.....	15	9	8	Inflam. of bowels.....	12	10	11
15	Measles.....	16	8	28	Measles.....	17	7	25	Erysipelas.....	14	10	10
16	Remittent fever.....	14	7	10	Inflam. of bowels.....	10	7	12	Measles.....	15	10	23
17	Smallpox.....	6	7	9	Smallpox.....	3	6	2	Remittent fever.....	16	8	9
18	Inflam. of bowels.....	11	5	11	Whooping-cough.....	7	6	4	Cholera morbus.....	13	7	11
19	Whooping-cough.....	7	5	3	Cholera morbus.....	5	5	2	Whooping-cough.....	8	6	5
20	Puerperal fever.....	3	5	1	Typhoid fever (ent.).....	3	5	2	Dysentery.....	9	5	9
21	Dysentery.....	5	4	3	Dysentery.....	5	4	5	Typhoid fever (ent.).....	5	4	4
22	Diphtheria.....	4	2	1	Diphtheria.....	4	4	3	Cholera infantum.....	8	4	9
23	Meningitis.....	2	2	2	Puerperal fever.....	3	4	4	Diphtheria.....	5	4	4
24	Cholera morbus.....	4	2	3	Meningitis.....	2	2	2	Inflam. of brain.....	3	2	5
25	Membran. croup.....	2	5	0	Cholera infantum.....	3	1	2	Puerperal fever.....	3	1	2
26	Typho-mal fever.....	1	3	0	Typho-mal fever.....	1	1	8	Meningitis.....	2	1	1
27	Cholera infantum.....	2	3	3	Membran. croup.....	2	5	4	Typho-mal fever.....	1	2	2
28	Inflam. of brain.....	3	0	1	Inflam. of brain.....	3	4	2	Membran. croup.....	7	0	0
	Reports received†.....	310	368	352	Reports received†.....	415	550	475	Reports received†.....	417	481	433

* This note is on the preceding page.

† The numbers in this line

† Statements in this exhibit for months in 1901, are

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1901. 65

of the reports received the diseases were stated to be present in each of the years 1900 for the period of 10 years, 1891-1900.

What per cent of the reports received stated presence of the disease.												
July.				August.				September.				Line number.
Diseases.	A.V. 1891-1900.	1901.†	1900.	Diseases.	A.V. 1891-1900.	1901.†	1900.	Diseases.	A.V. 1891-1900.	1901.†	1900.	
Average disease*..	18	15	17	Average disease*	20	17	19	Average disease*	21	10	21	
Diarrhea.....	55	57	52	Diarrhea.....	71	67	72	Rheumatism.....	58	57	61	1
Rheumatism.....	59	56	59	Rheumatism.....	56	55	57	Neuralgia.....	51	50	49	2
Neuralgia.....	50	49	49	Neuralgia.....	49	45	47	Diarrhea.....	71	66	75	3
Bronchitis.....	36	34	36	Tonsillitis.....	32	37	35	Bronchitis.....	41	43	37	4
Tonsillitis.....	33	34	38	Bronchitis.....	36	32	32	Tonsillitis.....	34	35	36	5
Cholera morbus.....	27	21	22	Cholera morbus.....	38	29	39	Cholera morbus.....	33	29	39	6
Consumption, pul.....	31	20	28	Cholera infantum.....	33	23	36	Cholera infantum.....	31	27	43	7
Cholera infantum.....	20	17	17	Dysentery.....	35	26	36	Dysentery.....	37	25	42	8
Inflam. of kidney.....	18	16	22	Consumption, pul.....	29	21	27	Consumption, pul.....	29	23	26	9
Intermittent fever.....	25	16	12	Typhoid fev. (ent.).....	14	19	16	Typhoid fev. (ent.).....	19	23	27	10
Influenza.....	19	15	19	Intermittent fev.....	28	17	18	Influenza.....	24	21	26	11
Dysentery.....	19	15	18	Inflam. of kidney.....	16	14	18	Intermittent fev.....	28	19	23	12
Pleuritis.....	11	11	10	Inflam. of bowels.....	17	14	15	Inflam. of kidney.....	15	16	17	13
Scarlet fever.....	7	11	9	Remittent fever.....	21	14	11	Inflam. of bowels.....	15	16	14	14
Inflam. of bowels.....	13	10	12	Influenza.....	18	13	17	Remittent fever.....	23	16	14	15
Remittent fever.....	19	8	9	Scarlet fever.....	6	10	10	Scarlet fever.....	8	11	10	16
Smallpox.....	12	7	1	Pleuritis.....	8	7	10	Pleuritis.....	11	9	12	17
Typhoid fever (ent.).....	8	7	1	Smallpox.....	1	6	5	Erysipelas.....	10	6	10	18
Measles.....	8	7	14	Erysipelas.....	10	5	8	Pneumonia.....	7	5	5	19
Erysipelas.....	12	7	11	Measles.....	4	3	6	Smallpox.....	.03	5	0	20
Diphtheria.....	4	5	2	Pneumonia.....	5	3	4	Whooping-cough.....	8	4	5	21
Pneumonia.....	7	4	5	Diphtheria.....	4	3	2	Diphtheria.....	5	4	4	22
Whooping-cough.....	9	3	8	Puerperal fever.....	12	2	1	Puerperal fever.....	2	3	2	23
Meningitis.....	12	12	6	Whooping-cough.....	9	1	8	Measles.....	2	3	4	24
Typho-mal fever.....	3	1	4	Inflam. of brain.....	2	1	1	Typho-mal fever.....	6	1	4	25
Puerperal fever.....	12	1	1	Meningitis.....	12	1	2	Meningitis.....	2	.9	1	26
Inflam. of brain.....	3	.4	1	Typho-mal fever.....	5	.6	6	Inflam. of brain.....	2	.7	2	27
Membran. croup.....	.7	0	.2	Membran. croup.....	.4	0	.2	Membran. croup.....	.7	0	.6	28
Reports received†.....	429	555	485	Reports received†.....	472	478	608	Reports received†.....	434	437	501	
October.				November.				December.				Line number.
Diseases.	A.V. 1891-1900.	1901.†	1900.	Diseases.	A.V. 1891-1900.	1901.†	1900.	Diseases.	A.V. 1891-1900.	1901.†	1900.	
Average disease*..	20	17	19	Average disease*	19	17	18	Average disease*	19	18	18	
Rheumatism.....	62	58	59	Rheumatism.....	63	63	60	Rheumatism.....	65	62	63	1
Neuralgia.....	56	53	55	Neuralgia.....	59	55	58	Bronchitis.....	60	58	67	2
Bronchitis.....	48	46	43	Bronchitis.....	55	54	51	Neuralgia.....	59	56	59	3
Diarrhea.....	52	46	57	Tonsillitis.....	49	50	48	Tonsillitis.....	54	56	50	4
Tonsillitis.....	42	41	41	Influenza.....	43	44	36	Influenza.....	59	52	52	5
Influenza.....	29	27	29	Diarrhea.....	29	26	34	Diarrhea.....	24	23	24	6
Consumption, pul.....	32	33	27	Inflam. of kidney.....	19	18	21	Pleuritis.....	19	23	20	7
Typhoid fever (ent.).....	17	20	17	Consumption, pul.....	28	18	24	Pneumonia.....	25	21	22	8
Inflam. of kidney.....	17	20	17	Pneumonia.....	18	17	16	Consumption, pul.....	28	20	24	9
Intermittent fever.....	26	16	34	Pleuritis.....	16	16	12	Inflam. of kidney.....	18	20	16	10
Scarlet fever.....	9	14	13	Typhoid fev. (ent.).....	18	14	32	Scarlet fever.....	11	18	15	11
Pleuritis.....	12	13	11	Intermittent fev.....	22	14	19	Typhoid fev. (ent.).....	12	11	27	12
Dysentery.....	22	13	22	Scarlet fever.....	11	13	17	Smallpox.....	.5	10	5	13
Pneumonia.....	11	12	7	Smallpox.....	.3	9	2	Erysipelas.....	15	10	9	14
Remittent fever.....	23	12	18	Diphtheria.....	8	9	9	Intermittent fev.....	17	10	13	15
Inflam. of bowels.....	12	12	11	Remittent fever.....	18	9	15	Inflam. of bowels.....	10	8	10	16
Cholera morbus.....	15	11	20	Erysipelas.....	13	8	9	Whooping-cough.....	7	7	7	17
Cholera infantum.....	13	9	13	Whooping-cough.....	7	8	2	Remittent fever.....	16	6	15	18
Diphtheria.....	7	6	6	Inflam. of bowels.....	9	7	6	Measles.....	4	5	4	19
Erysipelas.....	11	5	9	Dysentery.....	7	6	6	Diphtheria.....	7	5	6	20
Whooping-cough.....	6	5	1	Measles.....	2	5	3	Dysentery.....	4	3	3	21
Measles.....	2	4	4	Cholera morbus.....	5	4	5	Typho-mal fever.....	3	2	2	22
Smallpox.....	.3	3	.9	Typho-mal fever.....	5	2	5	Cholera morbus.....	3	2	3	23
Typho-mal fever.....	7	2	4	Inflam. of brain.....	2	.9	2	Meningitis.....	1	2	1	24
Puerperal fever.....	2	.5	.6	Puerperal fever.....	.7	.1	1	Inflam. of brain.....	2	1	2	25
Membran. croup.....	1	.5	.6	Membran. croup.....	.7	1	1	Puerperal fever.....	2	1	2	26
Meningitis.....	1	.5	1	Cholera infantum.....	.4	.2	.2	Membran. croup.....	2	.6	2	27
Inflam. of brain.....	2	.2	.2	Meningitis.....	1	0	.2	Cholera infantum.....	1	.4	.7	28
Reports received†.....	427	555	540	Reports received†.....	432	451	432	Reports received†.....	402	464	422	

state how many reports were received for the month in the given years.

graphically represented in Diagrams 1 to 5, in this article.

66 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 2.—By months and by geographical divisions of the State,* the names of 229 observers, whose weekly reports of diseases for 1901 are compiled in Tables 1 to 17 in this article, the localities* for which they report, and the number of reports received from each observer.

Divisions and localities represented and physicians who reported. (Voluntary observers in italics.)	Weekly reports in 1901.—Compiled in this article.												
	Year 1901.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All localities.....	5,850	587	474	450	368	550	481	555	478	437	555	451	464
Upper Peninsula Division.....	470	40	30	33	27	30	39	49	46	40	51	43	42
Bessemer, E. H. Madajesky, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Crystal Falls, A. M. Darling, M. D.	24							3	4	4	5	4	4
Escanaba, C. H. Long, M. D.	17	5	4	4	4								
Escanaba, A. Nelson, M. D.	30					4	5	4	4	4	5	4	4
Garden, W. A. Lemire, M. D.	15					4	4	4	2	3		2	
Gladstone, W. McCallum, M. D.	29					4	4	4	4	4	5	4	4
Ishpeming, W. S. Picotte, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Marquette, A. E. Brown, M. D.	15	5	4	4	2								
Marquette, R. C. Markham, M. D.	35				2	5	4	5	4	3	5	3	4
Menominee, P. J. Noer, M. D.	33					3	4	5	4	4	5	4	4
Ontonagon, J. S. Nitterauer, M. D.	30	5	3	2	4			4	2	4	4	2	4
Osceola Tp., <i>W. T. S. Gregg, M. D.</i>	26					3	4	5	4		3	3	4
Rockland Tp., <i>W. C. Gates, M. D.</i>	12	5	3	4									
St. Ignace, J. F. Darby, M. D.	35			3	3	4	3	3	4	4	4	3	4
Sault Ste. Marie, J. J. Griffin, M. D.	13	5	4	4									
Wakefield, J. H. Eddy, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Northwestern Division.....	334	37	35	33	28	39	24	24	20	17	32	21	24
Bear Lake, C. A. Norconk, M. D.	47	5	4	3	4	4	4	5	4	2	5	3	4
Cadillac, D. Ralston, M. D.	23		4	4		3	4			4	2	2	4
Fife Lake, L. S. Walter, M. D.	50	3	4	4	4	5	4	5	4	4	5	4	4
Kingsley, G. L. Fenton, M. D.	47	5	4	4	3	5	4	4	4	3	5	2	4
Manistee, A. A. McLarty, M. D.	15	5	4	4	2								
Manistee, J. A. King, M. D.	37				2	5	4	5	4	4	5	4	4
Manton, T. A. Corlett, M. D.	14	4	3	4	3								
Manton, E. Morgan, M. D.	11					4					3	2	2
Suttons Bay, E. C. Vande Walker, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Thompsonville, R. McDermott, M. D.	11	5	4	2									
Thompsonville, J. W. Tomlinson, M. D.	7				2	5							
Traverse City, J. M. Wilhelm, M. D.	20	5	4	4	4	3							
Northern Division.....	337	33	26	28	23	36	29	24	25	32	29	22	28
Boyne City, A. J. H. DeLacy, M. D.	23	3	4	4	4	4	4						
Boyne Falls, G. L. Laraway, M. D.	45	5	4	4	4	3	4	4	4	4	5	4	4
Central Lake, R. E. L. Gibson, M. D.	33					4	4	5	4	4	5	4	4
Charlevoix, A. A. Swinton, M. D.	44	5	4	4	4	5	3		3	4	5	4	3
Cheboygan, S. A. St. Amour, M. D.	32					3	4	5	4	4	4	4	4
East Jordan, F. A. Foster, M. D.	13	5	4	4									
East Jordan, F. C. Warne, M. D.	10					2				4			4
Elk Rapids, A. B. Conklin, M. D.	25				2	4	3		3	4	5	2	2
Kalkaska, P. W. Pearsall, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Mancelona, C. Beaver, M. D.	23	5	4	4	3	5	2						
Petoskey, G. E. Reycraft, M. D.	37	5	4	4	2	4	3	5	3	4			3
Northeastern Division.....	142	19	8	12	12	16	8	8	11	11	14	11	12
Harrisville, <i>D. W. Mitchell, M. D.</i>	52	5	4	4	4	5	4	5	4	4	5	4	4
Onaway, H. M. Farnham, M. D.	5	5											
Oscoda, E. D. Merritt, M. D.	4					4							
Rogers City, C. W. Isaminger, M. D.	44	5	4	4	4	3	4	3	3	3	4	3	4
West Branch, W. H. Witter, M. D.	37	4		4	4	4			4	4	5	4	4
Western Division.....	519	56	40	42	38	55	41	48	37	34	46	44	38
Casnovia, F. D. Hersey, M. D.	13	5	3	3								2	
Custer, A. D. Kibbie, M. D.	41	5	4	4	4	5	3	5	4			4	3
Grand Haven, W. S. Walkey, M. D.	51	5	3	4	4	5	4	5	4	4	5	4	4
Grand Rapids, <i>A. Haslewood, M. D.</i>	33	5	4	4	4	4	4	5	3				
Grandville, W. A. Bryson, M. D.	8					4	2			2			
Holland, B. B. Godfrey, M. D.	29	5	3	3		4	4	5			5	2	2
Lisbon, R. L. Cornwell, M. D.	7	3		2	2								
Lisbon, K. Greiner, M. D.	8					3	2	3					
Lowell, O. C. McDannell, M. D.	51	5	4	4	4	5	4	5	4	4	4	4	4
Ludington, F. W. Graham, M. D.	17	5	4	4	4								

*The counties in each division are shown on maps of the State, on pages 201 and 217 of the report of this Board for 1886.

a In many cases the reports include sickness in the vicinity as well as the corporate limits of the places named.

TABLE 2.—CONTINUED.

Divisions and localities represented and physicians who reported. (Voluntary observers in italics.)	Weekly reports in 1901.—Compiled in this article.												
	Year 1901.	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Western Division—Continued.													
Ludington, W. A. Russell, M. D.	5					3	2						
Muskegon, J. F. Denslow, M. D.	32					3	4	5	4	4	4	4	4
Muskegon Heights, M. Mason, M. D.	32					4	4	5	4	4	5	4	2
Rockford, H. O. Sarber, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Sand Lake, A. R. Hicks, M. D.	36	4	3	4	4	5				4	5	4	
Sparta, B. J. Zudzenze, M. D.	9	5	4										
Sparta, F. D. Harter, M. D.	13			2	4	4			3				
Sparta, John Gillett, M. D.	12										4	4	4
White Cloud, W. C. Derby, M. D.	51	4	4	4	4	5	4	5	4	4	5	4	4
Whitehall, S. W. Keyes, M. D.	19								3	4	4	4	4
Northern Central Division.													
Beaverton, F. S. Pierce, M. D.	257	22	16	15	15	15	28	24	26	20	30	19	27
Big Rapids, W. A. Whitney, M. D.	26	5	2	4			2		4	3			
Clare, J. A. Reeder, M. D.	33					3	4	5	4	2	5	4	4
Ewart, J. M. Wilkinson, M. D.	12	5	2		3								
Farwell, L. L. Kelly, M. D.	26			2		4	2	4	2	3	5		4
Gladwin, C. G. Suylandt, M. D.	10		2	3					2				3
Harrison, D. M. Langan, M. D.	5				3				2				
Mecosta, J. Snyder, M. D.	14	3	2		3	3	3						
Mt. Pleasant, C. D. Pullen, M. D.	10	4	4		2								
Mt. Pleasant, L. J. Burch, M. D.	29						3	5	4	4	5	4	4
Reed City, E. W. Spinney, M. D.	5						3		2				
Roscommon, J. H. Curnalia, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Tustin, C. W. Logan, M. D.	15						3				5	3	4
Bay and Eastern Division.													
Algonac, W. E. Bostwick, M. D.	744	77	63	58	63	78	64	81	51	50	59	50	50
Almont, D. H. Burley, M. D.	19	4	4	3	4	4							
Bay City, H. Gilbert, M. D.	51	5	4	4	4	4	4	5	4	4	5	4	4
Brown City, J. W. Weed, M. D.	16					3	4	5	4				
Cass City, D. P. Deming, M. D.	27	5	2	3	2	4	3	3		2		3	
Crosswell, T. S. Kingston, M. D.	50	5	4	4	4	5	3	5	3	4	5	4	4
Deckerville, G. C. Vincent, M. D.	17	5	4	4	4								
Dryden, I. E. Parker, M. D.	51	5	4	4	4	5	4	5	3	4	5	4	4
Emmett, J. L. Chester, M. D.	52	4	3	4	4	5	4	4	2	4	3	3	2
Forestville, A. Stephens, M. D.	15						4	5	4	2			
Lapeer, J. H. Taylor, M. D.	9	5	4										
Lapeer, W. Blake, M. D.	13				2			4	2			2	3
Lexington, L. T. Schurrer, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Marine City, T. E. DeGurse, M. D.	29					4	4	5	3	4	3	3	3
Oakley, T. H. O'Rourke, M. D.	35					5	4	5	4	4	5	4	4
Reese, J. MacKenzie, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
St. Charles, A. Paterson, M. D.	11	5	3		3								
Sebewaing, H. R. Morris, M. D.	23		3	4	4	4	2				3		3
Thornville, J. S. Caulkins, M. D.	33	5	4	4	4	5	4	5	2				
Vassar, F. D. LeValley, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
West Bay City, A. F. Hagadorn, M. D.	44	4	4	4	4	5	4	5		2	5	3	4
Yale, W. G. Wight, M. D.	51	5	4	4	4	5	4	5	4	4	5	4	3
Central Division.													
Alma, I. N. Brainerd, M. D.	1,032	99	89	71	66	99	82	101	87	76	109	76	77
Bancroft, T. N. Yeomans, M. D.	30						4	5	4	4	5	4	4
Belding, I. Ohlinger, M. D.	19	3				4		3		2	3	2	2
Brighton, A. A. Boylan, M. D.	16	5	4	2	2	3							
Brighton, H. M. Ptolmey, M. D.	5						2	3					
Charlotte, F. J. Knight, M. D.	8	4	4										
Charlotte, F. A. Weaver, M. D.	10	3	4	3									
Durand, A. G. Cowles, M. D.	4					4							
Durand, L. D. Hixson, M. D.	16	5	4	4	3								
Eagle, H. N. Swaney, M. D.	26					4		5	4		5	4	4
Eaton Rapids, A. E. West, M. D.	16				3	4	2	3	4				
Elsie, J. H. Travis, M. D.	37	5	4	4	4	5	4	5	4	2			
Elsie, D. F. Brown, M. D.	7	4	3										
Fenton, A. G. Wright, M. D.	19								4	3	5	4	3
Flint, J. H. Charters, M. D.	30	5						4	4	4	5	4	4
Flint, N. Bates, M. D.	12	5	4	3									
Flushing, C. S. Wheeler, M. D.	30						4	5	4	4	5	4	4
Gaines, G. H. Alway, M. D.	52	5	4	4	4	5	4	5	4	4	4	4	4
Grand Ledge, W. E. Wilson, M. D.	13	5	4	4									
Greenville, C. O. Jenison, M. D.	12							4	2	4	4	2	
Hamburg Tp., J. N. Swartz, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Hastings, D. E. Fuller, M. D.	44	5	4	4	4	5	4	5	4	4	5	4	3
	30					4	4	5	3	2	5	4	3

68 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 2.—CONTINUED.

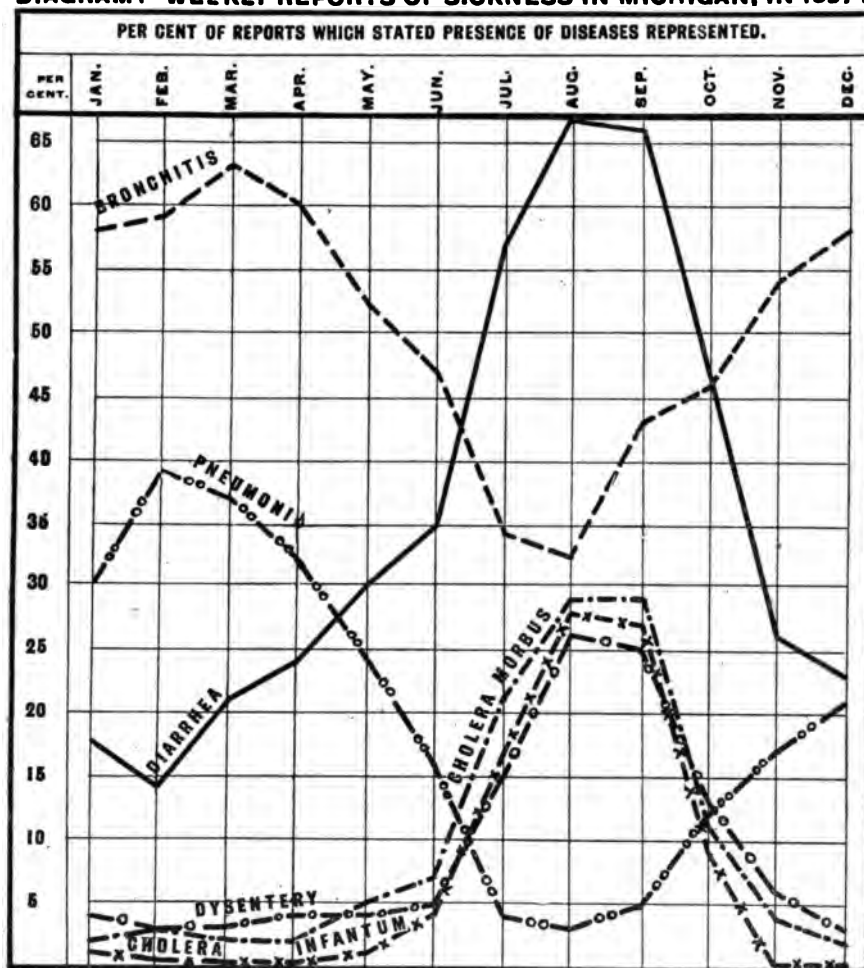
Divisions and localities represented and physicians who reported.	Weekly reports in 1901.—Compiled in this article.												
(Voluntary observers in italics.)	Year 1901.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Central Division—Continued.													
Howard City, J. Totten, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Ionia, H. Tremayne, M. D.	43	5	4	4	4	5	3	3	4	4	4	3	3
Laingsburg, R. H. Scott, M. D.	37	—	4	4	4	—	3	4	4	4	5	4	3
Lakeview, F. R. Blanchard, M. D.	37	—	4	4	4	—	3	4	3	3	5	3	4
Lansing, V. W. Conner, M. D.	17	5	—	—	4	—	—	—	—	—	—	—	—
Linden, M. E. Topping, M. D.	5	—	3	—	—	—	—	—	—	—	—	—	—
Linden, H. H. Chase, M. D.	35	—	—	—	—	4	4	5	4	4	4	4	4
Maple Rapids, R. H. Sanborn, M. D.	5	—	—	2	—	3	—	—	—	—	—	—	—
Mason, G. E. Mann, M. D.	10	—	—	—	—	—	—	—	—	2	4	2	2
Morrice, W. Shaw, M. D.	29	—	—	—	—	5	4	5	—	4	3	2	4
Mt. Morris, F. H. Callow, M. D.	6	—	—	—	—	—	—	—	—	—	—	—	—
Nashville, E. T. Morris, M. D.	13	5	4	4	—	—	—	—	—	—	—	—	—
Nashville, A. F. Hutchinson, M. D.	17	—	—	—	2	3	2	—	—	—	4	3	3
Ovid, J. E. Taylor, M. D.	51	5	4	3	4	5	4	5	4	4	5	4	4
Owosso, C. Shickles, M. D.	30	—	—	—	—	4	4	5	4	4	5	4	4
Perry, L. M. Cudworth, M. D.	22	—	3	—	3	—	2	—	2	—	4	4	4
Pottsville, E. R. Espie, M. D.	9	5	4	—	—	—	—	—	—	—	—	—	—
St. Johns, H. D. Squair, M. D.	13	5	4	4	—	—	—	—	—	—	—	—	—
St. Johns, J. V. Dooling, M. D.	29	—	—	—	3	5	4	—	4	4	5	—	4
Sheridan, H. B. Johnson, M. D.	6	—	—	—	—	3	3	—	—	—	—	—	—
Sunfield, E. M. Snyder, M. D.	19	—	—	—	2	4	4	5	4	—	—	—	—
Vermontville, C. S. Snell, M. D.	17	—	—	—	4	4	3	3	—	2	—	—	—
Vernon, W. H. Holtzman, M. D.	42	5	4	4	4	5	3	4	3	2	3	3	2
Southwestern Division.													
Allegan, D. Calkins, M. D.	532	44	39	39	20	49	50	53	43	44	59	45	47
Benton Harbor, W. Ryno, M. D.	8	5	3	—	—	—	—	—	—	—	—	—	—
Bloomington, T. H. Ransom, M. D.	35	—	—	—	—	5	4	5	4	4	5	4	4
Buchanan, J. A. Garland, M. D.	8	—	—	—	—	—	—	—	—	—	—	—	—
Douglas, H. A. Stroud, M. D.	12	5	4	3	—	—	—	—	—	—	—	—	—
Dowagiac, W. J. Ketcham, M. D.	12	4	4	4	—	—	—	—	—	—	—	—	—
Eau Claire, J. H. Herring, M. D.	5	—	—	—	—	—	3	—	—	2	—	—	—
Fennville, W. H. Andrews, M. D.	30	—	—	—	—	4	5	4	4	4	5	4	4
Gallen, S. A. Clark, M. D.	13	5	4	4	—	—	—	—	—	—	—	—	—
Gallen, F. O. Higbee, M. D.	29	5	4	4	4	5	—	5	2	—	—	—	—
Hartford, H. C. Maynard, M. D.	12	—	—	—	—	—	3	4	4	3	4	5	3
Marcellus, E. Shillito, M. D.	31	—	—	—	—	—	4	4	3	4	4	4	4
Niles, J. D. Greenamyer, M. D.	15	—	—	—	—	4	4	3	—	—	4	2	2
Otsego, M. Chase, M. D.	47	5	4	4	4	4	4	3	4	4	5	4	4
Paw Paw, C. S. Maynard, M. D.	28	—	—	—	—	—	—	—	—	—	—	—	—
Plainwell, L. H. Gileland, M. D.	16	—	—	4	3	5	4	5	4	3	4	4	4
St. Joseph, F. M. Gowdy, M. D.	33	—	—	—	—	5	4	5	4	3	4	4	4
St. Joseph, F. M. Gowdy, M. D.	8	—	4	4	—	—	—	—	—	—	—	—	—
Saugatuck, J. H. Pear, M. D.	13	5	4	4	—	—	—	—	—	—	—	—	—
Saugatuck, R. J. Walker, M. D.	36	—	—	—	3	5	4	5	4	4	4	4	3
South Haven, M. E. Bishop, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Three Oaks, R. C. Knox, M. D.	32	—	—	—	—	5	4	4	3	4	4	4	4
Vandalia, O. J. East, M. D.	28	—	—	—	—	—	3	5	4	3	5	4	4
Watervliet, W. L. Garratt, M. D.	13	5	4	4	—	—	—	—	—	—	—	—	—
Watervliet, F. W. Brown, M. D.	16	—	—	—	2	3	—	—	—	4	3	—	4
Southern Central Division.													
Adrian, W. E. Jewett, Jr., M. D.	943	111	85	81	51	84	70	88	85	75	74	70	69
Albion, G. C. Hafford, M. D.	6	—	—	—	—	—	—	—	—	—	—	—	—
Albion, W. C. Marsh, M. D.	29	—	—	—	—	3	2	4	4	3	5	4	4
Ann Arbor, E. A. Clark, M. D.	17	5	4	4	4	—	—	—	—	—	—	—	—
Augusta, C. E. Doyle, M. D.	22	5	4	4	4	5	—	—	—	—	—	—	—
Burr Oak, Rose Crofford, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Camden, J. A. Bates, M. D.	11	4	4	3	—	—	—	—	—	—	—	—	—
Centerville, A. F. Kingsley, M. D.	7	—	—	—	—	3	2	—	—	2	—	—	—
Climax, O. F. Seely, M. D.	12	—	—	2	—	—	—	—	4	4	—	2	—
Clinton, G. V. Randall, M. D.	12	4	—	3	2	3	—	—	—	—	—	—	—
Colon Tp., <i>M. L. Bacon, M. D.</i>	47	5	3	4	4	5	3	5	4	3	4	4	3
Concord, W. N. Keeler, M. D.	40	5	4	4	3	5	4	4	4	4	3	—	—
Concord, J. L. Parmeter, M. D.	30	—	—	—	—	—	4	5	3	3	4	4	4
Constantine, D. E. Thomas, M. D.	13	5	4	4	—	—	—	—	—	—	—	—	—
Constantine, L. K. Slote, M. D.	27	—	—	—	—	3	3	4	4	3	3	3	4
Deerfield, G. E. Kerr, M. D.	6	3	3	—	—	—	—	—	—	—	—	—	—
Galesburg, W. L. McBeth, M. D.	34	5	4	3	2	4	2	—	3	3	—	4	4
Grass Lake, W. Lyon, M. D.	13	—	—	—	—	—	—	—	—	—	5	4	4
Hanover, A. L. Ambrose, M. D.	20	4	3	4	2	—	3	—	4	—	—	—	—
Hillsdale, F. C. Mason, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Homer, L. M. Henderson, M. D.	14	—	—	—	—	—	—	—	4	4	2	—	—
Hudson, G. W. Rice, M. D.	29	—	—	—	—	—	3	5	4	4	5	4	4

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1901. 69

TABLE 2.—CONCLUDED.

Divisions and localities represented and physicians who reported. (Voluntary observers in italics.)	Weekly reports in 1901.—Compiled in this article.												
	Year 1901.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Southern Central Division—Continued.													
Jackson, J. T. Main, M. D.	48	5	4	4	4	4	3	3	4	4	5	4	4
Jonesville, M. Graham, M. D.	8							5					3
Litchfield, J. J. Heator, M. D.	33					4	4	5	4	4	4	4	4
Marshall, F. M. Foote, M. D.	12	4	3	3	3								
Marshall, L. S. Joy, M. D.	32					3	4	5	4	3	5	4	4
Mendon, W. A. Royer, M. D.	8	5	3										
Mendon, C. E. Barninger, M. D.	15												
Milan, A. G. Mesic, M. D.	32	4		2		4	2	3	3	4	5	4	4
North Adams, F. Noyes, M. D.	6		3										
Quincy, W. H. Baldwin, M. D.	11	5	4	2									
Sturgis, T. O. Potter, M. D.	4	4											
Tecumseh, <i>J. F. Jenkins, M. D.</i>	46	5	4	4	2	4	4	5	4	4	4	3	3
Tecumseh, W. H. Maddox, M. D.	20	5	4	4	2								
Tekonsha, J. F. Alton, M. D.	28					4	4	4	3	3	4	3	3
Union City, W. C. Henderson, M. D.	39	5	4	4	4	5	4	5	4	4			
Vicksburg, C. H. McKain, M. D.	3		3										
White Pigeon, W. C. Cameron, M. D.	12	4	4	4									
Wright Tp., <i>C. Bates, M. D.</i>	52	5	4	4	4	5	4	5	4	4	5	4	4
Ypsilanti, O. E. Pratt, M. D.	17	5	4	4									
Ypsilanti, H. B. Britton, M. D.	22					3	4	3	2	2	3	3	2
Southeastern Division.													
Armada, C. H. Lincoln, M. D.	540	49	41	38	25	49	46	55	47	38	52	50	50
Armada, E. E. Evans, M. D.	13	5	4	4								4	4
Delray, A. I. Burdino, M. D.	24					3	4	5	4				
Delray, B. G. Monkman, M. D.	9		3	3	3								
Dundee, E. E. Richardson, M. D.	15	5	4	4	2	3	4	5	4	4	4	4	4
Dundee, A. E. Unger, M. D.	27					3	3	4	4	4	4	3	2
Hamtramck, J. E. Burgess, M. D.	13										5	4	4
Hamtramck Tp., <i>H. W. Scott, M. D.</i>	8											4	4
Highland Park, A. Stewart, M. D.	9							5	4				
Highland Tp., <i>S. L. Weisbrod, M. D.</i>	6	4	2										
Memphis, E. D. Mills, M. D.	50	5	4	4	3	5	4	5	4	4	4	4	4
Orion, T. H. Cooper, M. D.	26	5	4	3		4	4					4	2
Petersburg, F. B. Jones, M. D.	30					3	4	4	4	3	5	4	3
Plymouth, F. B. Adams, M. D.	51	5	4	4	4	5	4	4	4	4	5	4	4
Richmond, J. F. McCarty, M. D.	52	5	4	4	4	5	4	5	4	4	5	4	4
Romeo, W. Greenshields, M. D.	44	5	4	4	2	5	3	3	4	5	5	2	3
South Lyon, L. A. Sayles, M. D.	31					3	4	5	4	3	5	3	4
Warren, J. C. Flynn, M. D.	50	5	4	4	3	5	4	5	4	4	5	3	4
Woodmere, T. Schmalzriedt, M. D.	50	5	4	4	4	5	4	5	3	4	5	3	4

DIAGRAM I—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1901.



[PLATE 1133]

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1901. 71

TABLE 4*.—*Stating for each of 11 years, 1891–1901, the number and per cent of observers by whom the following diseases were reported present; also an average for the period of 10 years, 1891–1900. The diseases are arranged in order of greatest number of observers who reported them present in 1901.† (Continued for each month of 1900 and 1901 on the two pages following.)*

Line number.	Diseases.	Observers by whom the several diseases were reported present— average per cents (per month) of those making reports.‡											
		Av. 1891– 1900.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.
	Average for tabulated diseases reported present.....	29	26	28	26	26	27	21	30	30	31	33	37
1	Rheumatism.....	79	74	76	74	76	81	78	78	78	80	83	86
2	Neuralgia.....	75	71	72	69	70	74	74	74	74	76	80	83
3	Tonsillitis.....	67	66	65	63	60	64	70	66	64	71	71	74
4	Bronchitis.....	69	64	64	64	65	66	70	69	67	72	73	75
5	Influenza.....	58	56	54	53	59	61	59	58	55	57	56	69
6	Diarrhea.....	59	54	59	55	55	53	55	60	58	61	63	67
7	Pneumonia.....	36	35	30	31	33	36	34	36	36	37	43	40
8	Inflam. of kidney.....	32	31	34	30	29	30	29	33	31	29	34	36
9	Pleuritis.....	31	31	30	30	29	30	32	32	28	27	35	36
10	Consumption, pul.....	37	27	30	28	25	25	29	35	43	47	49	60
11	Intermittent fever.....	35	23	27	28	32	27	31	35	36	37	43	52
12	Scarlet fever.....	17	21	21	14	9	8	14	19	24	19	22	17
13	Inflam. of bowels.....	25	20	24	21	24	24	23	25	27	25	28	31
14	Typhoid fever (ent.)..	16	20	22	14	14	11	16	21	18	15	15	16
15	Dysentery.....	26	19	28	23	23	24	23	28	27	25	29	30
16	Cholera morbus.....	25	19	25	19	23	21	23	26	27	26	29	31
17	Erysipelas.....	28	18	20	20	25	27	26	28	27	29	34	39
18	Remittent fever.....	28	17	20	21	22	20	27	32	31	28	34	43
19	Cholera infantum.....	19	15	22	14	16	14	15	22	20	18	21	23
20	Smallpox.....	.6	11	2	.7	.1	.09	1	.5	1	.3	.08	0
21	Diphtheria.....	10	11	8	5	6	10	10	10	13	13	15	13
22	Measles.....	14	9	23	12	12	22	12	8	11	14	7	17
23	Whooping-cough.....	12	7	8	6	8	7	12	14	18	15	18	16
24	Puerperal fever.....	7	5	4	5	5	7	6	7	6	9	11	8
25	Typho-mal. fever.....	7	3	5	3	5	2	6	8	8	9	10	12
26	Meningitis.....	5	3	3	7	6	3	4	2	4	5	5	6
27	Inflam. of brain.....	7	3	3	5	5	6	7	8	9	8	9	11
28	Membran. croup.....	4	1	1	2	2	3	2	4	5	5	8	10
	No. of observers.....	§187	229	210	213	217	167	144	185	189	205	199	145
	Av. No. of observers } per month.....	104	126	118	111	114	95	82	94	116	113	109	91

* Table 3 is manuscript, not printed for lack of space. † For 1901 the names of the observers and the number of the reports received from each are stated in Table 2.

‡ Foot note on page 77. § Average per year.

72 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 4.*—CONTINUED.—Per cent of observers by whom the several diseases were for the period of

Per cent of observers by whom the diseases were reported present.†													
Line number.	January.				February.				March.				
	Diseases.	A.V. 1891-1900.	1901.	1900.	Diseases.	A.V. 1891-1900.	1901.	1900.	Diseases.	A.V. 1891-1900.	1901.	1900.	
	Average	30	29	29	Average	29	26	26	Average	31	27	27	
1	Influenza.....	83	86	79	Influenza.....	86	89	74	Influenza.....	87	85	79	
2	Neuralgia.....	78	77	75	Rheumatism.....	81	80	77	Neuralgia.....	81	75	78	
3	Rheumatism.....	82	77	83	Neuralgia.....	80	77	76	Rheumatism.....	83	75	81	
4	Tonsillitis.....	77	73	74	Bronchitis.....	78	72	74	Bronchitis.....	78	70	74	
5	Bronchitis.....	78	69	72	Tonsillitis.....	74	72	72	Tonsillitis.....	76	69	73	
6	Pneumonia.....	59	60	52	Pneumonia.....	59	58	52	Pneumonia.....	60	55	55	
7	Diarrhea.....	43	40	44	Pleuritis.....	39	40	39	Diarrhea.....	45	39	37	
8	Pleuritis.....	41	40	42	Inflam. of kidney.....	33	31	32	Inflam. of kidney.....	34	37	33	
9	Inflam. of kidney.....	34	33	43	Scarlet fever.....	17	28	21	Pleuritis.....	41	35	36	
10	Typhoid fev. (ent.).....	11	31	11	Consumption, pul.....	37	28	32	Consumption, pul.....	38	30	25	
11	Consumption, pul.....	38	28	35	Diarrhea.....	40	27	32	Scarlet fever.....	18	26	16	
12	Scarlet fever.....	22	24	25	Erysipelas.....	31	24	22	Erysipelas.....	33	23	20	
13	Intermittent fever.....	27	23	23	Inflam. of bowels.....	19	17	18	Intermittent fev.....	29	18	22	
14	Erysipelas.....	30	21	27	Typhoid fev. (ent.).....	9	16	8	Inflam. of bowels.....	23	15	22	
15	Inflam. of bowels.....	22	19	32	Intermittent fev.....	25	10	18	Remittent fever.....	20	12	11	
16	Diphtheria.....	13	16	9	Remittent fever.....	21	9	14	Typhoid fev. (ent.).....	7	12	8	
17	Remittent fever.....	22	16	17	Smallpox.....	5	9	0	Measles.....	21	10	36	
18	Dysentery.....	13	13	13	Diphtheria.....	11	9	5	Diphtheria.....	10	9	6	
19	Smallpox.....	3	11	0	Whooping-cough.....	10	8	7	Dysentery.....	12	9	4	
20	Measles.....	12	8	26	Cholera morbus.....	7	6	5	Smallpox.....	1	9	1	
21	Inflam. of brain.....	6	6	4	Dysentery.....	10	6	7	Puerperal fever.....	8	8	5	
22	Meningitis.....	4	6	3	Measles.....	15	5	31	Whooping-cough.....	11	7	8	
23	Typho-mal. fever.....	4	6	4	Puerperal fever.....	7	4	3	Cholera morbus.....	9	5	9	
24	Cholera morbus.....	8	6	9	Meningitis.....	5	3	5	Inflam. of brain.....	8	2	2	
25	Whooping-cough.....	13	5	14	Typho-mal. fever.....	3	3	1	Typho-mal. fever.....	3	2	3	
26	Cholera infantum.....	4	4	6	Cholera infantum.....	3	2	3	Meningitis.....	6	2	5	
27	Puerperal fever.....	8	4	6	Inflam. of brain.....	8	2	2	Cholera infantum.....	3	2	2	
28	Membran. croup.....	7	3	1	Membran. croup.....	7	2	1	Membran. croup.....	6	2	6	
Observers§.....				99	124	102	Observers§.....				99	123	102
	April.				May.				June.				
	Diseases.	A.V. 1891-1900.	1901.	1900.	Diseases.	A.V. 1891-1900.	1901.	1900.	Diseases.	A.V. 1891-1900.	1901.	1900.	
	Average	30	24	27	Average.....	29	27	29	Average.....	28	24	26	
1	Neuralgia.....	79	69	75	Rheumatism.....	82	81	85	Rheumatism.....	78	70	78	
2	Influenza.....	77	68	78	Neuralgia.....	75	73	76	Neuralgia.....	72	70	73	
3	Rheumatism.....	82	66	75	Tonsillitis.....	68	73	72	Tonsillitis.....	59	64	58	
4	Tonsillitis.....	72	64	69	Bronchitis.....	70	68	74	Bronchitis.....	63	61	60	
5	Bronchitis.....	77	62	76	Influenza.....	61	58	62	Diarrhea.....	58	56	58	
6	Pneumonia.....	51	45	47	Diarrhea.....	48	51	49	Influenza.....	41	41	41	
7	Diarrhea.....	44	38	39	Pneumonia.....	40	43	39	Pneumonia.....	23	33	15	
8	Pleuritis.....	38	36	40	Inflam. of kidney.....	36	39	44	Inflam. of kidney.....	32	32	38	
9	Consumption, pul.....	40	32	24	Pleuritis.....	34	35	40	Consumption, pul.....	38	29	31	
10	Inflam. of kidney.....	34	29	33	Consumption, pul.....	41	29	33	Pleuritis.....	27	27	28	
11	Erysipelas.....	30	22	20	Intermittent fev.....	37	25	31	Intermittent fev.....	37	22	26	
12	Intermittent fever.....	33	20	22	Erysipelas.....	33	22	24	Inflam. of bowels.....	28	21	23	
13	Scarlet fever.....	19	19	20	Scarlet fever.....	18	20	30	Erysipelas.....	29	19	19	
14	Typhoid fev. (ent.).....	6	14	9	Inflam. of bowels.....	25	19	30	Scarlet fever.....	15	17	21	
15	Measles.....	26	12	44	Remittent fever.....	25	17	19	Remittent fever.....	27	16	20	
16	Dysentery.....	12	11	12	Measles.....	28	14	50	Smallpox.....	8	16	2	
17	Inflam. of bowels.....	21	10	19	Dysentery.....	14	12	18	Cholera morbus.....	27	15	22	
18	Smallpox.....	1	10	1	Cholera morbus.....	14	12	9	Measles.....	24	14	36	
19	Remittent fever.....	23	10	17	Smallpox.....	8	12	5	Whooping-cough.....	13	12	8	
20	Whooping-cough.....	11	8	4	Puerperal fever.....	8	10	1	Dysentery.....	20	11	21	
21	Puerperal fever.....	8	8	5	Whooping-cough.....	12	8	8	Cholera infantum.....	17	10	17	
22	Cholera morbus.....	9	6	8	Diphtheria.....	9	8	6	Typhoid fev. (ent.).....	9	8	8	
23	Diphtheria.....	8	4	2	Typhoid fev. (ent.).....	7	8	3	Diphtheria.....	9	7	7	
24	Meningitis.....	6	3	5	Cholera infantum.....	8	5	6	Inflam. of brain.....	7	5	8	
25	Membran. croup.....	5	2	0	Meningitis.....	6	3	3	Puerperal fever.....	8	4	6	
26	Cholera infantum.....	4	8	7	Typho-mal. fever.....	3	2	3	Meningitis.....	5	1	3	
27	Typho-mal. fever.....	3	8	0	Membran. croup.....	4	2	2	Typho-mal. fever.....	4	7	8	
28	Inflam. of brain.....	8	0	3	Inflam. of brain.....	8	2	6	Membran. croup.....	2	0	0	
Observers§.....				94	118	99	Observers§.....				104	130	108
Observers§.....				94	118	99	Observers§.....				110	135	126

*, †, ‡ These notes are on the preceding page. § The numbers in this line

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1901. 73

reported present by months in each of the years 1900-1901,† and the average by months 10 years, 1891-1900.

Per cent of observers by whom the diseases were reported present.†												
July.				August.				September.				Line number.
Diseases.	A v. 1891-1900.	1901.	1900.	Diseases.	A v. 1891-1900.	1901.	1900.	Diseases.	A v. 1891-1900.	1901.	1900.	
Average	30	26	27	Average	32	26	31	Average	32	28	31	Line number.
Diarrhea	75	77	74	Diarrhea	87	83	89	Diarrhea	87	76	88	
Rheumatism	77	72	75	Rheumatism	76	71	76	Rheumatism	77	72	71	2
Neuralgia	71	70	74	Neuralgia	70	60	68	Neuralgia	70	67	62	3
Tonsillitis	58	60	58	Tonsillitis	57	59	59	Bronchitis	62	60	52	4
Bronchitis	55	52	55	Cholera morbus	71	51	62	Tonsillitis	56	52	55	5
Cholera morbus	48	41	37	Bronchitis	55	50	54	Dysentery	60	48	66	6
Cholera infantum	36	39	28	Cholera infantum	53	46	62	Cholera morbus	56	46	58	7
Inflam. of kidney	31	33	35	Dysentery	50	44	65	Cholera infantum	51	44	66	8
Dysentery	36	30	35	Inflam. of bowels	36	28	30	Typhoid fev. (ent.)	29	37	38	9
Consumption, pul.	39	27	34	Intermittent fev.	43	28	30	Inflam. of bowels	31	31	26	10
Intermittent fev.	41	25	22	Typhoid fev. (ent.)	23	27	28	Influenza	38	29	41	11
Inflam. of bowels	29	25	26	Influenza	30	26	29	Intermittent fev.	44	29	33	12
Pleuritis	23	25	20	Remittent fev.	35	25	24	Consumption, pul.	36	28	30	13
Influenza	31	23	33	Inflam. of kidney	29	25	33	Remittent fev.	36	24	21	14
Remittent fev.	32	20	17	Consumption, pul.	37	24	30	Inflam. of kidney	28	24	27	15
Measles	17	16	25	Scarlet fever	13	14	20	Pleuritis	24	20	24	16
Erysipelas	26	16	21	Pleuritis	20	14	26	Scarlet fever	14	17	17	17
Scarlet fever	13	16	18	Erysipelas	23	10	18	Erysipelas	22	13	17	18
Typhoid fever	15	14	18	Smallpox	3	9	1	Pneumonia	17	12	11	19
Diphtheria	7	13	4	Diphtheria	8	8	8	Diphtheria	9	9	7	20
Smallpox	4	13	2	Pneumonia	13	7	10	Puerperal fever	6	7	6	21
Pneumonia	26	11	13	Puerperal fever	9	5	4	Whooping-cough	14	6	9	22
Typho-mal fever	7	5	7	Measles	9	4	13	Smallpox	1	6	0	23
Puerperal fever	6	5	5	Meningitis	9	4	4	Measles	4	5	7	24
Whooping-cough	15	3	11	Inflam. of brain	15	3	15	Typho-mal fever	13	2	10	25
Meningitis	4	2	3	Whooping-cough	15	3	15	Meningitis	13	2	4	26
Inflam. of brain	2	2	3	Typho-mal fever	11	2	12	Inflam. of brain	13	2	4	27
Membran. croup	0	0	7	Membran. croup	1	0	7	Membran. croup	0	0	2	28
Observers§	113	122	141	Observers§	111	133	136	Observers§	112	124	141	
October.				November.				December.				Line number.
Diseases.	A v. 1891-1900.	1901.	1900.	Diseases.	A v. 1891-1900.	1901.	1900.	Diseases.	A v. 1891-1900.	1901.	1900.	
Average	30	28	31	Average	29	37	26	Average	28	26	26	
Neuralgia	74	71	76	Rheumatism	77	77	68	Rheumatism	80	78	77	1
Rheumatism	78	71	74	Bronchitis	71	72	63	Tonsillitis	74	74	67	2
Diarrhea	74	69	79	Neuralgia	75	70	73	Bronchitis	74	71	67	3
Bronchitis	66	66	59	Tonsillitis	70	66	63	Influenza	74	69	68	4
Tonsillitis	66	64	66	Influenza	59	59	47	Neuralgia	75	67	77	5
Influenza	44	45	45	Diarrhea	51	48	58	Pneumonia	44	41	38	6
Typhoid fev. (ent.)	33	34	48	Pneumonia	37	31	29	Diarrhea	44	41	39	7
Inflam. of kidney	30	33	31	Pleuritis	30	30	20	Pleuritis	34	39	33	8
Intermittent fev.	41	32	42	Inflam. of kidney	31	29	33	Scarlet fever	20	29	25	9
Pleuritis	26	31	21	Scarlet fever	18	22	27	Inflam. of kidney	32	29	30	10
Pneumonia	25	28	21	Typhoid fev. (ent.)	27	21	42	Consumption, pul.	34	23	28	11
Consumption, pul.	33	28	31	Intermittent fev.	35	21	29	Erysipelas	30	19	19	12
Cholera infantum	26	27	30	Consumption, pul.	35	20	28	Intermittent fev.	27	19	19	13
Inflam. of bowels	26	26	25	Inflam. of bowels	20	18	17	Inflam. of bowels	22	16	23	14
Cholera morbus	31	26	40	Diphtheria	13	18	16	Smallpox	7	16	7	15
Dysentery	43	25	46	Erysipelas	26	17	18	Typhoid fev. (ent.)	18	15	38	16
Scarlet fever	16	34	24	Remittent fev.	31	17	27	Remittent fev.	25	12	22	17
Remittent fev.	36	22	32	Dysentery	18	14	14	Whooping-cough	11	10	3	18
Diphtheria	13	16	14	Smallpox	5	11	2	Diphtheria	14	10	14	19
Erysipelas	22	14	22	Whooping-cough	12	10	4	Measles	7	10	6	20
Whooping-cough	9	8	5	Cholera morbus	13	8	9	Dysentery	11	9	10	21
Measles	3	6	9	Measles	5	6	5	Typho-mal fever	6	5	5	22
Typho-mal fever	13	6	9	Typho-mal fever	9	4	8	Cholera morbus	8	5	9	23
Smallpox	6	5	2	Inflam. of brain	6	2	3	Meningitis	4	4	3	24
Meningitis	3	3	5	Cholera infantum	7	2	8	Puerperal fever	6	3	5	25
Membran. croup	4	3	2	Puerperal fever	6	2	3	Inflam. of brain	6	3	9	26
Puerperal fever	6	3	3	Membran. croup	6	2	3	Cholera infantum	3	2	2	27
Inflam. of brain	6	8	9	Meningitis	2	0	8	Membran. croup	6	2	4	28
Observers§	109	121	117	Observers§	106	127	120	Observers§	104	129	117	

state how many observers reported for the month in the given year.

TABLE 5.—WEEKLY REPORTS OF DISEASES IN MICHIGAN IN 1901.—Exhibiting for the year and for each month of the year ending December 28, 1901, a summary relative to diseases in the State of Michigan; also for each month a summary relative to diseases in each of 17 geographical divisions* of the State.—Indicating the prevalence as regards time and area. Compiled from 5,850 weekly reports by 229 health officers of cities and villages, and voluntary correspondents of the State Board of Health, reporting the diseases under their observation.

Number of observers, reports, etc.†	Diseases.	Average order of prevalence where present.															Av. 1891- 1900.
		Average per cent of observers report- ing presence of. b	Average per cent of weeks reported present where present. c	Per cent of reports stating presence of. d	Average order of prevalence where present. e	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.		
	Average for tabulated diseases re- ported present.	26	66	18	2.9	2.8	2.8	2.6	2.7	2.7	3.0	3.0	3.3	3.1	3.3	2.9	
	Brain, inflammation of.....	3	34	.9	4.0	3.3	3.7	3.6	3.4	4.1	4.0	4.8	4.3	3.9	4.9	4.0	
	Bowels, inflammation of.....	20	46	9	3.7	3.7	3.6	3.3	3.3	3.5	3.6	3.8	4.0	4.1	4.3	3.7	
	Bronchitis.....	64	77	50	2.6	2.6	2.5	2.5	2.6	2.4	2.6	2.6	2.5	2.6	2.7	2.6	
	Measles.....	3	41	1	3.3	3.6	3.3	3.2	3.4	3.6	3.7	3.9	4.4	3.7	5.3	3.8	
	Cholera infantum.....	15	47	7	3.0	3.0	3.1	2.8	2.9	2.9	3.0	3.3	3.4	3.6	3.6	3.2	
	Cholera morbus.....	19	52	10	2.9	2.9	2.9	2.7	3.0	2.9	3.0	3.3	3.3	3.4	3.4	3.1	
	Consumption, pulmonary.....	27	79	22	3.1	3.0	2.9	2.9	3.1	3.0	3.5	3.4	3.5	3.7	3.8	3.3	
	Croup, membranous.....	1	30	.4	4.3	4.0	3.7	3.6	2.9	3.9	4.6	4.5	4.1	4.7	4.4	4.0	
	Diphtheria.....	11	42	5	3.5	3.5	3.4	3.1	2.9	3.7	4.4	3.5	3.4	3.5	4.4	3.6	
	Diarrhea.....	54	65	36	2.6	2.4	2.5	2.4	2.5	2.5	2.5	2.5	2.6	2.6	2.7	2.5	
	Dysentery.....	19	47	9	3.2	3.2	3.0	3.0	3.2	3.0	3.2	3.3	3.6	3.8	3.8	3.3	
	Erysipelas.....	18	50	9	3.8	3.7	3.7	3.3	3.4	3.5	3.7	3.8	3.9	4.1	4.2	3.7	
	Fever, intermittent.....	23	58	14	3.0	2.9	2.9	2.6	2.7	2.7	2.9	2.9	2.9	3.0	3.2	2.9	
	Fever, remittent.....	17	51	9	3.3	3.2	3.3	2.9	3.2	2.9	3.1	3.1	2.9	2.9	3.3	3.1	
	Fever, typhoid (enteric).....	20	63	13	3.1	2.8	2.9	2.9	3.3	3.3	3.4	3.6	3.2	3.6	3.5	3.3	
	Fever, typho-malarial.....	3	41	1	3.7	3.0	2.6	3.1	2.7	2.8	3.2	3.7	3.6	3.7	3.6	3.2	

localities represented, 196.
observers during the year, 229.
reports compiled, 5,850. a
reports per month, 488.

ending December 28, 1901.

For the year	Whole number of Average number of Whole number of Average number of Total number of	Influenza.....	56	78	44	1.9	2.1	1.7	1.8	1.8	2.0	2.2	2.0	2.1	2.0	1.9
		Kidney, inflammation of.....	31	61	20	3.7	3.5	3.4	3.2	3.4	3.5	3.6	3.7	3.6	3.9	3.6
		Measles.....	9	56	5	2.5	2.4	2.3	2.7	2.3	2.7	3.1	2.8	3.3	3.0	2.7
		Neuralgia.....	71	70	57	2.5	2.5	2.4	2.3	2.4	2.3	2.5	2.5	2.5	2.8	2.5
		Pleuritis.....	31	54	17	3.7	3.7	3.6	3.3	3.6	3.4	3.8	3.8	4.0	4.1	3.7
		Pneumonia.....	35	54	20	3.5	3.6	3.5	3.2	3.4	3.2	3.7	3.7	3.6	4.0	3.6
		Puerperal fever.....	5	38	2	3.1	3.4	3.5	3.1	3.1	3.2	3.5	3.9	3.8	4.1	3.6
		Rheumatism.....	74	80	61	2.3	2.3	2.3	2.2	2.3	2.3	2.7	2.6	2.6	2.7	2.5
		Scarlet fever.....	21	62	14	2.7	3.0	3.1	2.7	3.0	3.1	3.5	3.3	3.6	3.2	3.3
		Smallpox.....	11	63	7	2.8	2.7	4.7	2.0	2.0	6.3	2.8	4.1	4.8	5.0	3.4
		Tonsillitis.....	66	70	46	2.9	2.9	2.7	2.7	2.6	2.6	3.0	3.0	2.8	2.9	2.9
		Whooping-cough.....	7	62	5	2.8	2.5	2.3	2.4	2.1	2.4	2.6	2.9	3.0	2.9	2.6

*The counties in each division are shown on maps of the State, on pages 201 and 217 of the report of this Board for 1886.

†The names of observers, and number of reports received from each, are shown in Table 2.

aNot every one of the observers sent in a report for every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks.

bThe numbers in this column (pages 74-77) state not what per cent of the whole number of observers for the year reported the disease present at some time during the year, but the average (for the twelve months) of the per cents (of observers making reports for the several months) by which the disease was reported present in those months. The column for the year is thus a statement for an average month. But on pages 76 and 77 the numbers in the "per cent of observers" column are statements for the month, and not averages. This column indicates the area of prevalence except that in a few instances there were two or more observers in one city or village.

cThis column states for the year or given month, what per cent the number of reports which stated a disease to be present is of the number of card-reports received, for the given time, from such of the observers as reported the diseases present. It is, therefore, an average, not for all localities represented, but only for those at which the given disease was reported present. In the line "average for tabulated diseases" it states what per cent the number of times all diseases were reported present is of the number of times they *might have been* so reported on the cards received, for the time specified, from the observers who during that time reported the diseases present (that is, if each of the observers had on every card he sent reported every disease present which he reported present at all). It will be seen that this is a more accurate average than would be obtained by dividing the sum of the column by the number of diseases reported present.

dThis column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from all observers in the State or Division, as the case may be. It combines, and states, in a general way, an idea of the time a disease was prevalent, with an idea of the area of its prevalence. Had every observer sent a report every week of the month or year, the numbers in this column would be (for the State) the product of the numbers in the same line in the two preceding columns.

eThe diseases having the greatest number of cases was to be marked 1 in the order: the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals (for the State) of the order of prevalence column, in Table 3 (a table giving statements for each locality omitted in printing this report, for want of room) by the number of observers who reported the disease present. The column is, therefore, an average, not for all the localities represented, but only for those at which the given disease was reported present.

fThe numbers in the "average" lines for this column are found by dividing the sum of the totals in the order of prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of observers who reported the disease present, thus counting each observer once for every disease he reported present. As a rule, small numbers in this column indicate a large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer from week to week, the greater will be the "average" in this column.

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1901. 77

A. v. for tab. dis. rep. pres....	26	58	15	27	26	64	17	27	28	65	10	29	28	50	17	27	37	67	17	27	36	68	18	28
Brain, inflammation of.....	2	20	4	3.0	4	28	1	5.2	2	38	7	2.5	.8	20	2	4.0	2	36	9	4.0	3	31	1	5.5
Bowels, inflammation of.....	25	40	10	3.6	28	49	14	3.3	31	51	16	3.6	26	45	12	3.5	18	40	7	3.5	16	51	8	3.2
Bronchitis.....	52	64	34	2.7	50	63	32	3.1	60	72	43	3.0	66	70	46	2.4	72	76	54	2.3	71	82	58	2.1
Meningitis.....	3	67	2	4.7	4	28	1	2.4	3	29	9	3.5	3	20	5	3.3	0	0	0	0	0	41	2	3.6
Cholera infantum.....	39	42	17	3.0	46	61	28	2.7	44	58	27	3.1	27	32	9	3.2	2	25	4	4.0	2	33	4	3.5
Cholera morbus.....	41	49	21	2.8	51	57	29	2.6	46	62	29	2.6	26	42	11	3.0	8	52	4	3.2	5	41	1	3.0
Consumption, pulmonary.....	27	74	20	2.6	24	86	21	3.0	28	78	23	3.1	28	81	23	2.7	20	89	18	3.2	23	83	20	3.2
Croup, membranous.....	0	0	0	0	0	0	0	0	0	0	0	0	3	21	5	3.3	2	50	7	5.0	2	38	6	5.5
Diphtheria.....	13	35	5	3.5	8	35	3	3.0	9	40	4	3.2	16	34	6	3.7	18	46	9	3.9	10	47	5	4.2
Diarrhea.....	77	73	57	1.9	63	81	67	1.6	70	83	66	1.7	69	66	46	2.4	48	53	26	2.9	41	55	23	3.3
Dysentery.....	30	50	15	3.3	44	59	26	2.6	48	50	25	2.9	25	51	13	3.4	14	43	6	2.6	9	33	3	3.5
Erysipelas.....	16	42	7	3.8	10	45	5	3.5	13	45	6	3.6	14	35	5	3.5	17	45	8	3.3	19	52	10	4.0
Fever, intermittent.....	25	61	16	2.7	28	58	17	2.9	20	64	19	2.9	32	51	16	2.5	21	64	14	2.6	19	52	10	3.0
Fever, remittent.....	20	40	8	3.2	25	54	14	3.8	24	64	16	3.2	22	53	12	2.9	17	48	9	3.1	12	47	6	2.9
Fever, typhoid } Enteric.....	14	50	7	2.4	27	65	19	2.6	37	60	23	3.0	34	64	23	3.0	21	68	14	3.0	15	70	11	3.9
Fever, typhoid } Typho-mal.....	5	27	1	3.0	2	38	6	2.5	3	42	1	2.5	6	40	2	4.1	4	55	2	5.2	5	45	2	3.7
Influenza.....	23	65	15	2.7	26	48	13	2.8	29	71	21	2.7	45	59	27	2.4	59	77	44	2.1	69	77	52	1.8
Kidney, inflammation of.....	33	48	16	3.6	25	54	14	3.5	24	65	16	4.1	33	61	20	3.4	29	64	18	3.3	29	69	20	3.5
Measles.....	16	42	7	2.9	4	75	3	2.0	5	52	3	2.7	0	59	4	2.0	6	79	5	1.8	10	86	5	1.9
Neuralgia.....	70	69	49	2.2	60	73	45	2.5	67	73	50	2.6	71	74	53	2.3	70	78	55	2.3	67	85	56	2.6
Pleuritis.....	35	45	11	3.6	14	50	7	3.4	20	43	9	3.7	31	43	13	3.3	30	53	16	3.3	39	58	23	3.6
Pneumonia.....	11	35	4	2.9	7	47	3	4.1	12	37	2	4.2	28	44	12	3.2	31	53	17	3.4	41	51	21	3.2
Puerperal fever.....	5	24	1	1.7	5	33	2	2.4	17	42	3	3.4	3	23	5	3.3	2	25	7	3.0	3	31	1	3.3
Rheumatism.....	72	74	56	3.1	71	76	55	2.3	72	77	57	2.5	71	82	58	2.0	77	85	63	2.1	78	80	62	2.2
Scarlet fever.....	16	70	11	3.2	14	67	10	2.6	17	65	11	2.9	24	56	14	2.7	32	58	13	2.6	29	59	18	2.8
Smallpox.....	13	53	7	2.9	9	59	6	3.5	6	74	5	2.5	5	70	3	3.2	11	76	9	3.4	16	65	10	2.7
Tonsillitis.....	60	56	34	2.7	59	62	37	2.9	52	66	35	3.3	64	64	41	2.6	66	75	50	2.6	74	76	56	2.7
Whooping-cough.....	3	70	3	2.8	3	38	1	2.5	6	69	4	1.3	8	63	5	2.2	10	72	8	2.5	10	95	7	2.8

[Foot-note from page 71] The numbers opposite the names of the diseases do not state what per cent of the whole number of observers for the year reported the disease present at some time during the year, but state (on an average for the twelve months of the year) by what per cent of the observers making reports for the several months, the disease was reported as present in these months. The columns for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the observers for that month (the number of whom is stated at the foot of the column) reported the given disease in that month.

TABLE 5.—CONTINUED.—Diseases in the Upper Peninsula, the Northwestern, the Northern, and the Northeastern Divisions of the State for the year and by months in 1901; also an average for the period of 10 years, 1891-1900,—indicating what per cent of the weekly reports received stated the presence of the diseases named. a

Diseases.	Av. 1891-1900.	1901.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Av. for tab. dis. rep. pres....	21	16	20	19	17	17	18	14	14	15	16	15	16	15
Brain, inflammation of.....	3	1	3	0	0	0	0	0	2	2	0	0	0	5
Bowels, inflammation of.....	12	6	0	0	6	0	3	8	0	13	18	0	0	0
Bronchitis.....	59	37	50	43	52	30	43	41	24	11	25	41	53	40
Meningitis.....	3	6	3	13	12	15	17	10	10	2	0	0	0	2
Cholera infantum.....	17	11	0	7	0	0	0	0	18	54	30	6	0	0
Cholera morbus.....	14	7	3	10	0	0	0	3	12	22	20	6	0	2
Consumption, pulmonary.....	39	40	68	53	45	56	63	46	43	33	28	35	25	29
Croup, membranous.....	2	6	5	0	0	0	0	0	0	0	0	0	0	2
Diphtheria.....	9	9	23	7	6	7	10	8	4	0	10	14	14	10
Diarrhea.....	49	37	28	30	18	19	30	38	51	72	55	41	21	19
Dysentery.....	17	6	10	8	3	0	0	0	8	17	10	2	2	10
Erysipelas.....	12	2	8	7	0	0	0	0	0	0	0	0	0	0
Fever, intermittent.....	2	2	0	0	0	0	0	0	2	0	0	0	0	0
Fever, remittent.....	1	2	0	3	0	0	0	0	0	0	0	0	0	0
Fever, typhoid, } Enteric, Typho-mal. }	27	25	55	33	20	26	3	5	16	24	38	33	21	26
Influenza.....	43	29	60	67	58	44	20	13	0	4	8	25	42	36
Kidney, inflammation of.....	20	9	5	13	21	15	0	3	6	4	3	8	14	17
Measles.....	8	13	13	10	9	15	17	21	22	13	10	10	9	10
Neuralgia.....	51	22	28	40	33	26	20	13	16	15	38	25	16	7
Pleuritis.....	16	8	3	7	3	4	13	6	9	11	3	6	9	12
Pneumonia.....	27	19	30	13	18	19	37	28	8	2	5	22	26	24
Puerperal fever.....	5	2	0	0	2	22	10	0	0	0	0	0	0	0
Rheumatism.....	51	45	38	53	45	56	47	26	31	46	53	55	51	43
Scarlet fever.....	18	40	40	43	48	44	47	36	37	39	38	27	44	48
Smallpox.....	18	16	33	20	9	11	23	23	20	11	15	2	16	17
Tonsillitis.....	56	43	50	47	45	37	43	46	47	35	30	49	53	36
Whooping-cough.....	18	10	0	13	15	30	43	15	2	0	5	2	7	14

Upper Peninsula Division.*

Northwestern Division.*

Division.*

Av. 1891-1900.

1901.

January.

February.

March.

April.

May.

June.

July.

August.

September.

October.

November.

December.

A. v. for tab. dis. rep. pres.	Northern Division.*												Northeastern Division.*															
	21	19	23	21	23	17	18	20	19	21	23	12	15	18	22	23	21	31	30	32	28	19	21	25	28	26	24	
Brain, inflammation of.	7	3	0	0	0	0	0	0	0	0	3	0	0	0	3	5	11	0	0	0	0	25	0	0	0	7	9	8
Bowels, inflammation of.	14	8	12	0	0	0	0	7	8	4	0	0	0	5	23	28	27	63	83	25	38	0	25	45	55	64	18	42
Bronchitis.	66	53	82	75	89	65	44	48	25	40	53	28	41	42	63	78	74	88	100	100	75	50	64	66	71	91	100	0
Meningitis.	3	3	0	0	0	0	0	0	0	0	3	0	0	7	1	1	5	0	0	0	0	0	0	0	0	0	0	0
Cholera infantum.	0	10	0	0	4	0	0	0	29	48	41	3	5	0	5	8	0	0	0	0	13	0	0	36	27	14	0	0
Cholera morbus.	11	9	9	4	0	9	14	17	21	32	28	3	5	0	16	6	0	0	0	0	0	0	0	36	36	7	0	0
Consumption, pulmonary.	25	15	15	0	0	9	14	17	21	32	25	31	5	0	16	1	0	0	0	0	13	0	0	0	0	0	0	0
Group, membranous.	1	3	0	0	0	0	0	0	0	0	0	0	0	0	3	7	0	0	0	0	0	0	0	0	0	7	0	0
Diphtheria.	6	4	0	0	0	0	0	0	7	8	6	0	0	4	48	42	21	38	42	31	17	0	13	9	0	21	18	0
Diarrhea.	31	34	24	7	18	13	33	38	83	68	66	24	23	18	48	42	21	38	42	31	13	38	73	73	71	36	25	0
Dysentery.	15	21	0	4	7	9	11	28	58	48	53	14	18	7	6	4	5	0	0	0	0	0	0	18	27	0	0	0
Erysipelas.	28	13	15	29	18	17	17	21	4	8	13	3	5	4	31	33	16	38	8	33	25	50	63	36	36	36	50	0
Fever, intermittent.	18	7	12	7	4	4	3	10	4	16	6	7	0	4	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Fever, remittent.	15	12	15	4	11	9	19	21	0	20	34	7	0	0	7	19	5	0	0	25	19	0	0	36	36	36	25	0
Fever, typhoid, Typho-mal.	2	6	0	0	4	0	0	0	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Influenza.	47	36	73	89	89	52	28	10	0	8	6	0	0	0	58	62	63	100	100	83	63	50	63	36	36	57	45	67
Kidney, inflammation of.	24	24	21	32	32	22	28	38	13	20	25	17	23	18	48	65	42	88	82	83	75	63	63	45	64	71	73	50
Measles.	9	19	0	0	0	0	0	0	0	0	0	0	0	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuralgia.	59	63	85	71	82	74	58	79	63	56	50	45	45	50	69	83	79	100	100	88	63	63	73	73	71	82	100	0
Pleuritis.	24	33	45	46	57	35	39	34	39	16	22	7	14	46	32	53	32	88	67	75	69	50	63	36	27	43	45	58
Pneumonia.	21	25	48	36	39	17	19	10	13	8	3	14	35	50	21	34	53	75	75	67	56	38	0	0	0	9	17	0
Puerperal fever.	4	6	0	0	4	4	8	3	8	12	16	7	5	0	2	9	0	0	17	42	31	0	0	0	0	0	0	0
Rheumatism.	63	67	85	82	89	65	67	86	50	52	66	31	50	68	65	87	74	100	100	100	100	63	63	73	73	100	91	92
Scarlet fever.	8	8	0	0	7	0	11	21	13	0	13	7	14	7	7	6	21	0	0	0	13	0	0	0	9	14	0	0
Smallpox.	3	12	3	0	14	4	6	24	33	16	6	7	23	18	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis.	44	54	79	71	65	53	48	25	44	41	28	36	75	75	50	82	53	100	100	100	88	63	63	64	73	93	94	100
Whooping-cough.	6	7	0	4	14	0	0	14	0	0	13	14	23	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0

* , t. d. These notes are on the first page of Table 5.

TABLE 5.—CONTINUED.—Diseases in the Western, Northern Central, Bay and Eastern, and the Central Divisions of the State, for the year and by months in 1901; also an average for the period of 10 years, 1891-1900—indicating what per cent of the weekly reports received stated the presence of the diseases named.^a

Division.*	AV, 1891-1900.	1901.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	20	18	19	21	21	22	19	16	14	17	18	16	16	15
Division.*	AV, 1891-1900.	1901.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Av. for tab. dis. rep. pres.														
Brain, inflammation of.....	8	1	0	8	2	0	0	0	0	0	0	0	0	0
Bowels, inflammation of.....	13	5	7	5	5	8	5	7	6	0	0	0	0	0
Bronchitis.....	45	54	70	73	76	68	58	41	35	41	38	50	33	42
Measles.....	3	6	0	0	0	0	0	0	0	0	0	0	0	0
Meningitis.....	9	7	0	0	0	0	4	5	10	16	32	15	0	0
Cholera infantum.....	11	6	0	0	0	0	3	2	17	34	26	0	5	0
Cholera morbus.....	27	13	11	18	26	21	11	10	8	0	15	13	9	11
Consumption, pulmonary.....	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Croup, membranous.....	5	2	0	0	0	0	2	0	0	0	0	0	0	0
Diphtheria.....	39	32	16	10	19	24	36	29	31	78	71	48	18	18
Diarrhea.....	14	8	4	5	2	5	9	10	6	16	24	9	11	0
Dysentery.....	15	24	25	33	31	45	36	20	17	11	9	11	25	29
Erysipelas.....	27	17	14	15	19	18	27	15	8	16	29	30	11	11
Fever, intermittent.....	30	16	16	15	12	16	13	20	15	22	18	17	11	21
Fever, remittent.....	7	11	23	10	5	5	2	3	4	22	21	15	11	8
Fever, typhoid { Enteric.....	4	12	7	3	0	3	0	0	0	3	0	2	0	3
Typho-mal.														
Influenza.....	48	61	93	90	65	84	65	39	27	22	38	39	66	55
Kidney, inflammation of.....	23	8	2	10	12	11	15	15	4	8	9	4	7	0
Measles.....	5	2	0	0	0	0	0	10	10	0	0	2	0	0
Neuralgia.....	60	65	70	80	79	87	75	68	58	49	38	50	61	55
Pleuritis.....	17	11	14	18	17	18	4	2	0	0	18	17	16	16
Pneumonia.....	23	22	29	43	45	37	25	10	10	0	6	22	18	8
Puerperal fever.....	3	6	0	0	0	0	0	5	2	0	0	0	0	0
Rheumatism.....	62	63	59	73	76	61	65	61	69	59	47	63	73	50
Scarlet fever.....	9	9	4	10	11	13	15	15	8	6	4	9	11	0
Smallpox.....	2	8	16	12	0	18	7	5	0	0	0	0	20	18
Tonsillitis.....	43	47	50	55	50	66	45	34	31	59	38	48	39	53
Whooping-cough.....	7	5	6	10	7	0	0	10	10	5	8	2	2	0

Western Division.*

Northern Central Division.*

Northern Central Division.*

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1901. 81

Av. for tab. dis. rep. pres...	Central Division.*																		
	18	15	17	17	15	16	14	13	14	13	12	14	19	18	17	18	19	16	15
Brain, inflammation of.....	12	7	4	0	0	1	2	0	0	0	0	0	3	2	2	4	4	0*	4
Bowels, inflammation of.....	12	8	9	19	14	5	12	4	4	7	4	2	12	10	7	7	8	9	13
Bronchitis.....	48	43	55	46	55	40	53	40	30	34	46	50	54	46	47	51	48	39	30
Measles.....	1	1	6	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	1
Cholera infantum.....	12	8	0	0	2	1	6	25	31	10	0	2	8	6	2	1	5	11	15
Cholera morbus.....	13	7	0	2	3	0	1	19	28	7	0	0	12	13	4	4	5	12	26
Consumption, pulmonary.....	30	8	9	25	22	19	9	0	2	3	2	4	35	40	45	36	44	37	44
Croup, membranous.....	2	8	5	0	2	0	0	0	0	0	0	0	3	1	0	0	0	0	0
Diphtheria.....	9	6	8	6	7	3	3	6	7	10	2	2	3	4	6	2	6	0	5
Diarrhea.....	36	27	8	3	10	21	24	56	57	48	39	14	42	34	13	16	15	29	58
Dysentery.....	12	11	4	0	5	3	6	22	22	24	4	4	13	10	1	3	8	4	2
Erysipelas.....	11	10	8	6	14	10	10	18	16	5	14	12	12	8	5	8	17	18	11
Fever, intermittent.....	14	12	12	3	7	10	17	16	16	8	12	14	22	12	16	4	18	14	10
Fever, remittent.....	11	6	1	2	3	5	15	11	7	4	7	6	19	11	13	9	5	11	6
Fever, typhoid { Enteric.....	13	10	23	8	10	3	6	3	5	6	16	20	13	15	16	12	15	5	6
Typhoid.....	4	3	3	6	2	0	3	2	0	4	8	2	3	2	6	3	1	0	0
Influenza.....	42	41	77	83	67	57	37	30	12	12	20	17	45	43	61	73	58	34	23
Kidney, inflammation of.....	13	19	25	22	22	25	21	25	11	10	14	15	20	20	20	21	24	21	18
Measles.....	8	4	1	2	0	0	0	0	0	0	0	0	6	9	1	1	4	12	13
Neuralgia.....	50	47	53	52	52	51	53	58	41	33	36	41	62	59	53	48	73	61	54
Pleuritis.....	18	18	17	30	31	16	28	16	10	6	8	17	15	13	17	18	14	23	13
Pneumonia.....	18	22	35	43	50	29	22	20	5	4	6	7	18	20	25	46	30	33	23
Puerperal fever.....	3	3	6	5	0	2	5	0	1	0	8	0	2	1	0	2	1	3	0
Rheumatism.....	56	50	55	52	50	56	58	52	54	45	39	34	65	60	57	52	58	59	54
Scarlet fever.....	10	12	12	16	16	14	13	14	6	8	4	14	8	11	13	18	20	8	5
Smallpox.....	4	8	5	5	11	8	14	7	6	10	7	8	2	8	2	3	10	8	6
Tonsillitis.....	41	37	42	49	41	35	38	33	33	27	30	27	43	42	48	47	37	34	35
Whooping-cough.....	8	2	5	0	0	0	0	0	8	3	4	6	6	3	3	3	0	2	0

*. t. d. These notes are on the first page of Table 5.

TABLE 5.—CONTINUED.—Diseases in the Southwestern and Southern Central Divisions of the State, for the year and by months in 1901; also an average for the period of 10 years, 1891-1900—indicating what per cent of the weekly reports received stated the presence of the diseases named.^a

Division.*	Av. 1891-1900.	1901.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Av. for tab. dis. pres....	22	18	21	22	23	23	19	17	15	17	18	15	14	18
Brain, inflammation of.....	3	2	0	0	0	0	0	0	0	0	0	0	0	0
Bowels, inflammation of.....	13	8	9	8	3	5	2	0	0	0	0	0	0	0
Bronchitis.....	53	49	52	62	95	59	48	32	32	11	19	9	3	4
Meningitis.....	2	4	0	3	0	0	0	0	0	0	0	0	0	0
Cholera infantum.....	16	10	0	0	0	0	0	0	19	49	39	8	0	0
Cholera morbus.....	17	15	2	3	0	5	29	18	28	37	30	14	0	0
Consumption, pulmonary.....	29	18	11	21	10	20	16	10	17	26	30	17	16	26
Croup, membranous.....	3	4	0	0	3	0	0	0	0	0	0	0	0	0
Diphtheria.....	3	2	0	0	0	0	0	0	0	0	0	0	0	0
Diarrhea.....	37	44	23	15	33	60	37	50	60	72	70	46	62	34
Dysentery.....	13	9	0	8	5	0	4	6	9	35	25	10	0	0
Erysipelas.....	19	6	11	28	15	5	4	4	2	0	7	2	2	2
Fever, intermittent.....	38	33	57	18	31	65	39	38	34	30	45	26	20	23
Fever, remittent.....	26	12	9	5	18	30	12	4	17	19	20	8	7	2
Fever, typhoid { Enteric.....	5	6	0	3	0	0	0	0	11	9	18	12	9	4
Fever, typhoid { Typho-mal.....	3	2	0	0	0	0	0	0	6	0	5	2	0	0
Influenza.....	55	52	95	95	92	95	55	32	21	16	23	34	51	60
Kidney, inflammation of.....	21	16	34	33	25	30	22	20	8	0	7	7	7	19
Measles.....	8	8	2	0	3	5	18	34	11	12	5	2	0	4
Neuralgia.....	63	63	82	85	92	100	65	56	51	53	45	56	47	55
Pleuritis.....	15	12	14	18	23	20	10	6	6	0	15	16	19	13
Pneumonia.....	22	13	20	18	41	30	10	10	4	2	7	10	9	13
Puerperal fever.....	3	2	0	3	5	0	0	0	0	0	0	0	0	4
Rheumatism.....	76	67	89	79	85	95	73	62	55	51	50	53	67	70
Scarlet fever.....	9	13	34	56	31	5	2	0	0	0	7	8	21	4
Smallpox.....	4	9	0	0	0	0	8	2	0	0	0	0	0	0
Tonsillitis.....	44	48	75	59	69	95	49	46	35	23	30	36	49	60
Whooping-cough.....	8	8	0	10	10	20	16	16	16	0	5	8	9	4

* , t, d. These notes are on the first page of Table 5.

TABLE 5.—CONCLUDED.—Diseases in the Southeastern Division of the State, for the year and by months in 1901; also an average for the period of ten years, 1891-1900—indicating what per cent of the weekly reports received stated the presence of the diseases named.^a

Division.*	Diseases.	A v. 1891-1900.	1901. [†]	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	A v. for tab. dis. pres.	16	15	16	18	16	16	14	13	14	13	15	13	14	17
	Brain, inflammation of	2	4	2	0	0	0	0	0	0	0	0	0	0	0
	Bovels, inflammation of	8	11	12	7	5	5	4	17	15	17	18	12	0	8
	Bronchitis	48	41	45	56	53	48	35	37	18	19	32	31	56	72
	Menigitis	1	7	4	0	0	0	0	0	0	0	3	0	0	0
	Cholera infantum	7	6	4	0	0	0	0	7	18	13	18	4	0	0
	Cholera morbus	11	6	2	2	3	0	2	4	22	13	18	6	2	2
	Consumption, pulmonary	31	14	16	10	13	12	10	17	11	15	24	10	10	20
	Croup, membranous	2	6	0	5	0	0	0	0	0	0	0	0	0	0
	Diphtheria	33	37	27	5	26	28	31	35	67	51	68	42	25	26
	Diarrhea	6	5	10	7	5	0	4	0	0	2	3	4	4	12
	Dysentery	9	8	10	15	0	4	4	2	13	19	29	2	2	0
	Erysipelas	9	3	4	15	0	0	8	0	0	0	0	2	0	4
	Fever, intermittent	16	11	4	7	13	12	16	13	16	19	3	4	18	8
	Fever, remittent	10	9	4	2	11	12	4	4	9	13	21	13	10	8
	Fever, typhoid { Enteric	13	12	16	0	8	24	4	0	5	28	13	23	14	8
	Fever, typhoid { Typho-mal.	8	6	2	0	0	0	0	0	2	0	0	0	0	2
	Influenza	38	29	57	76	63	28	29	13	9	9	5	13	22	38
	Kidney, inflammation of	16	29	29	37	32	30	24	28	31	23	32	35	22	28
	Measles	7	5	4	0	0	8	10	2	11	0	0	0	8	10
	Neuralgia	43	49	67	61	61	56	61	41	31	34	39	44	46	58
	Pleuritis	12	15	18	17	8	24	12	13	20	22	13	11	16	16
	Pneumonia	16	17	22	41	16	48	22	20	2	6	0	12	8	24
	Puerperal fever	2	1	0	2	11	0	0	2	0	0	0	0	0	4
	Rheumatism	57	54	49	54	53	44	61	59	45	47	45	48	66	72
	Scarlet fever	9	15	0	22	24	0	12	17	22	17	16	13	22	14
	Smallpox	6	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tonsillitis	37	33	41	56	50	60	39	26	25	15	8	10	36	46
	Whooping-cough	6	4	0	5	3	4	0	0	5	0	8	12	10	4

*. †. d. These notes are on the first page of Table 5.

TABLE 6.—A summary for the year 1901, relative to diseases in each of the 11 divisions of the State,—indicating the prevalence as regards both time and area.

Diseases.	Upper Peninsula Division.*				Northwestern Division.*				Northern Division.*				Northeastern Division.*				Western Division.*			
	Per cent of observers re-ported present where	Av. percent of weeks re-ported present	Ing. percent of d	Av. order of prevalence where present, e	Per cent of observers re-ported present where	Av. percent of weeks re-ported present	Ing. percent of d	Av. order of prevalence where present, e	Per cent of observers re-ported present where	Av. percent of weeks re-ported present	Ing. percent of d	Av. order of prevalence where present, e	Per cent of observers re-ported present where	Av. percent of weeks re-ported present	Ing. percent of d	Av. order of prevalence where present, e	Per cent of observers re-ported present where	Av. percent of weeks re-ported present	Ing. percent of d	Av. order of prevalence where present, e
Av. for tab. dis. reported present.	25	64	16	2.6	31	73	23	3.4	31	63	19	2.5	26	77	26	3.2	28	64	18	2.5
Brain, inflammation of.....	2	28	1	4.0	8	31	1	4.0	1	25	3	2.0	14	28	5	3.3	3	36	1	3.3
Bowels, inflammation of.....	16	42	6	2.6	27	44	12	2.3	13	38	53	2.7	52	37	88	4.1	15	35	5	3.3
Bronchitis.....	53	67	27	2.3	77	88	69	2.3	71	77	53	2.3	73	84	1	2.8	62	74	54	2.7
Measles.....	92	48	16	3.3	13	41	8	3.5	92	44	10	3.3	11	25	8	2.8	16	42	7	2.5
Cholera infantum.....	11	23	11	2.9	13	59	11	3.5	21	48	9	2.7	17	59	0	2.7	37	37	6	2.5
Cholera morbus.....	51	82	40	2.7	47	85	38	3.2	21	69	15	2.7	7	59	1	2.0	17	37	6	2.5
Consumption, pulmonary.....	3	21	6	3.7	16	49	3	4.8	3	47	4	3.0	32	35	7	4.0	20	60	13	2.3
Diphtheria.....	30	43	9	2.0	62	64	47	3.6	3	47	3	3.0	14	52	4	2.5	7	50	12	3.0
Diarrhea.....	54	65	27	2.9	33	43	17	2.6	58	51	24	2.3	9	35	42	3.5	52	59	5	2.3
Dysentery.....	15	40	6	3.9	24	51	12	3.4	36	45	21	2.7	14	35	9	4.0	52	59	8	2.7
Erysipelas.....	8	25	2	2.0	25	42	12	2.4	30	51	13	2.7	32	78	4	3.5	38	46	8	3.0
Fever, intermittent.....	8	25	2	2.0	25	42	12	2.4	30	51	13	2.7	32	78	4	3.5	38	46	8	3.0
Fever, remittent.....	34	75	23	2.6	8	64	13	3.0	17	37	12	2.7	18	82	19	2.5	30	57	16	2.7
Fever, typhoid / Enteric.....	38	33	2	2.0	3	50	13	3.7	23	53	15	2.8	0	0	0	0	21	30	12	2.1
Influenza.....	38	78	29	1.7	66	76	50	2.3	46	75	36	2.5	53	89	63	1.2	65	31	31	1.9
Kidney, inflammation of.....	16	54	9	3.4	42	68	31	3.0	44	63	21	2.5	53	78	65	3.0	20	49	61	2.0
Measles.....	19	67	13	2.3	33	83	3	3.7	41	63	21	2.5	53	78	65	3.0	20	49	61	2.0
Neuritis.....	38	57	32	2.9	73	89	63	3.0	83	77	63	2.5	73	88	83	2.8	84	49	95	2.2
Pneumonia.....	23	35	19	3.5	53	59	33	4.5	57	59	33	3.5	55	75	33	3.3	33	49	11	3.0
Pneumonia, febrile.....	36	40	19	3.2	53	64	31	3.7	45	52	26	3.0	36	76	34	3.7	33	52	22	3.4
Rheumatism.....	3	59	2	2.5	2	44	1	3.5	16	35	6	3.0	16	46	9	2.7	73	73	63	2.5
Rheumatism, acute.....	62	73	45	1.9	70	96	7	2.7	88	75	67	2.3	73	92	87	2.4	73	73	63	2.5
Scarlet fever.....	53	73	40	1.9	34	75	26	1.8	16	49	18	1.9	9	47	0	0	15	56	8	1.7
Smallpox.....	26	60	15	2.6	13	62	8	3.2	21	59	12	2.5	49	47	0	0	15	56	8	1.7
Tonsillitis.....	58	70	43	2.6	71	83	59	3.6	78	71	54	2.0	70	91	82	3.6	12	63	47	2.7
Whooping-cough.....	15	72	10	2.5	8	81	6	4.0	12	67	7	2.0	0	0	0	0	8	52	5	2.3

TABLE 6.—CONCLUDED.

Diseases.	Northern Central Division.*					Bay and Eastern Division.*					Central Division.*					Southwestern Division.*					Southern Central Division.*					Southeastern Division.*				
	Per cent of observers re- porting presence of, b	Av. percent of weeks re- ported present where prevalence c	Per cent of reports stat- ing presence of, d	Av. order of prevalence where present. e		Per cent of observers re- porting presence of, b	Av. percent of weeks re- ported present where prevalence c	Per cent of reports stat- ing presence of, d	Av. order of prevalence where present. e		Per cent of observers re- porting presence of, b	Av. percent of weeks re- ported present where prevalence c	Per cent of reports stat- ing presence of, d	Av. order of prevalence where present. e		Per cent of observers re- porting presence of, b	Av. percent of weeks re- ported present where prevalence c	Per cent of reports stat- ing presence of, d	Av. order of prevalence where present. e		Per cent of observers re- porting presence of, b	Av. percent of weeks re- ported present where prevalence c	Per cent of reports stat- ing presence of, d	Av. order of prevalence where present. e		Per cent of observers re- porting presence of, b	Av. percent of weeks re- ported present where prevalence c	Per cent of reports stat- ing presence of, d	Av. order of prevalence where present. e	
Av. for tab. dis. rep. present..	19	65	12	2.9	2.9	24	63	15	3.2	3.2	26	67	18	2.9	2.9	27	66	19	2.8	2.8	25	59	15	2.4	2.4	25	59	15	2.4	
Brain, inflammation of.....	3	22	8	4.5	4.5	19	38	7	5.7	5.7	3	44	10	6.2	6.2	7	33	6	2.0	2.0	1	22	4	4.9	4.9	1	22	4	4.9	
Bowels, inflammation of.....	10	38	4	3.6	3.6	56	47	43	4.9	4.9	19	52	46	4.0	4.0	22	37	12	3.2	3.2	24	45	11	3.0	3.0	24	45	11	3.0	
Bronchitis.....	51	85	41	2.6	2.6	77	47	43	2.6	2.6	59	76	46	2.6	2.6	66	73	49	2.7	2.7	57	73	41	2.3	2.3	57	73	41	2.3	
Measles.....	4	25	1	2.7	2.7	7	20	2	2.7	2.7	7	20	2	2.7	2.7	22	25	6	2.5	2.5	12	25	7	3.0	3.0	12	25	7	3.0	
Meningitis.....	7	69	4	2.6	2.6	18	48	3	2.7	2.7	13	43	6	3.6	3.6	20	49	10	3.1	3.1	15	36	6	2.6	2.6	15	36	6	2.6	
Cholera infantum.....	8	72	5	3.5	3.5	15	50	7	2.7	2.7	23	56	13	3.3	3.3	26	57	15	2.9	2.9	20	71	14	2.3	2.3	20	71	14	2.3	
Cholera morbus.....	6	46	2	2.0	2.0	12	66	8	3.6	3.6	42	90	40	2.9	2.9	40	86	18	5.7	5.7	44	86	18	2.6	2.6	44	86	18	2.6	
Consumption, pulmonary.....	0	0	0	0	0	0	50	6	4.3	4.3	4	50	1	2.0	2.0	2	22	4	6.5	6.5	4	20	1	3.0	3.0	4	20	1	3.0	
Croup, membranous.....	13	51	7	4.1	4.1	13	40	27	4.2	4.2	49	43	34	3.9	3.9	62	71	44	5.0	5.0	67	69	40	3.1	3.1	67	69	40	3.1	
Diphtheria.....	44	68	20	2.6	2.6	54	59	27	2.6	2.6	44	63	34	2.7	2.7	62	71	44	2.6	2.6	57	69	40	3.1	3.1	57	69	40	3.1	
Diarrhea.....	10	38	4	3.4	3.4	24	47	11	4.0	4.0	22	44	10	3.4	3.4	16	40	9	3.2	3.2	17	53	9	3.0	3.0	17	53	9	3.0	
Dysentery.....	25	41	10	3.7	3.7	20	51	10	4.8	4.8	14	53	8	4.3	4.3	16	40	9	3.2	3.2	13	38	5	3.5	3.5	13	38	5	3.5	
Erysipelas.....	29	77	25	1.9	1.9	19	63	12	3.8	3.8	50	57	12	3.2	3.2	24	46	12	3.9	3.9	33	42	13	2.8	2.8	33	42	13	2.8	
Fever, intermittent.....	15	61	9	3.8	3.8	14	44	6	4.2	4.2	31	64	16	3.6	3.6	10	59	6	4.0	4.0	18	63	12	3.1	3.1	18	63	12	3.1	
Fever, remittent.....	17	64	11	2.7	2.7	12	56	10	3.1	3.1	21	64	15	3.0	3.0	5	38	2	2.5	2.5	3	30	1	5.3	5.3	3	30	1	5.3	
Fever, typhoid, Typho-mal.....	0	0	0	0	0	0	51	3	5.7	5.7	57	62	43	3.3	3.3	60	84	55	1.9	1.9	46	84	55	2.6	2.6	46	84	55	2.6	
Influenza.....	43	69	28	2.5	2.5	30	76	41	1.9	1.9	29	64	20	3.7	3.7	28	57	16	4.1	4.1	33	60	29	2.7	2.7	33	60	29	2.7	
Kidney, inflammation of.....	11	47	6	4.4	4.4	11	47	6	4.4	4.4	17	54	9	4.4	4.4	16	51	8	4.1	4.1	16	51	8	3.8	3.8	16	51	8	3.8	
Measles.....	53	76	40	2.7	2.7	62	55	13	2.4	2.4	32	55	13	2.4	2.4	77	81	63	2.5	2.5	86	77	45	3.0	3.0	86	77	45	3.0	
Neuralgia.....	19	61	11	3.6	3.6	25	58	14	4.3	4.3	25	58	13	3.3	3.3	23	46	12	3.6	3.6	30	54	17	2.5	2.5	30	54	17	2.5	
Pneumonia.....	18	57	11	3.4	3.4	36	52	20	3.3	3.3	36	52	20	3.3	3.3	29	46	12	3.6	3.6	30	54	17	2.5	2.5	30	54	17	2.5	
Pneumonia, puerperal.....	6	25	2	2.5	2.5	4	33	1	4.0	4.0	4	33	1	3.0	3.0	28	38	2	3.8	3.8	4	43	1	5.4	5.4	4	43	1	5.4	
Rheumatism.....	54	74	40	2.1	2.1	65	77	50	2.6	2.6	68	86	60	2.3	2.3	79	84	67	2.3	2.3	93	76	54	2.1	2.1	93	76	54	2.1	
Rheumatism, acute.....	15	53	10	3.4	3.4	19	51	11	3.8	3.8	21	61	13	3.7	3.7	21	61	13	3.7	3.7	24	65	15	3.1	3.1	24	65	15	3.1	
Scarlet fever.....	18	58	10	2.6	2.6	12	61	8	3.7	3.7	11	73	8	2.5	2.5	5	56	10	3.5	3.5	7	61	9	0	0	7	61	9	0	
Smallpox.....	44	63	25	3.6	3.6	60	62	37	3.1	3.1	59	70	42	3.1	3.1	66	73	48	3.1	3.1	81	72	50	2.7	2.7	81	72	50	2.7	
Tonsillitis.....	8	65	5	3.5	3.5	3	68	3	3.0	3.0	5	68	3	3.1	3.1	11	66	8	3.0	3.0	5	45	4	1.6	1.6	5	45	4	1.6	
Whooping-cough.....	8	65	5	3.5	3.5	3	68	3	3.0	3.0	5	68	3	3.1	3.1	11	66	8	3.0	3.0	5	45	4	1.6	1.6	5	45	4	1.6	

*Counties in each division are shown on maps of the State, on pages 201 and 217 of the report of this Board for 1886. b, c, d, e. Foot-notes with these marks are below the first part of Table 5.

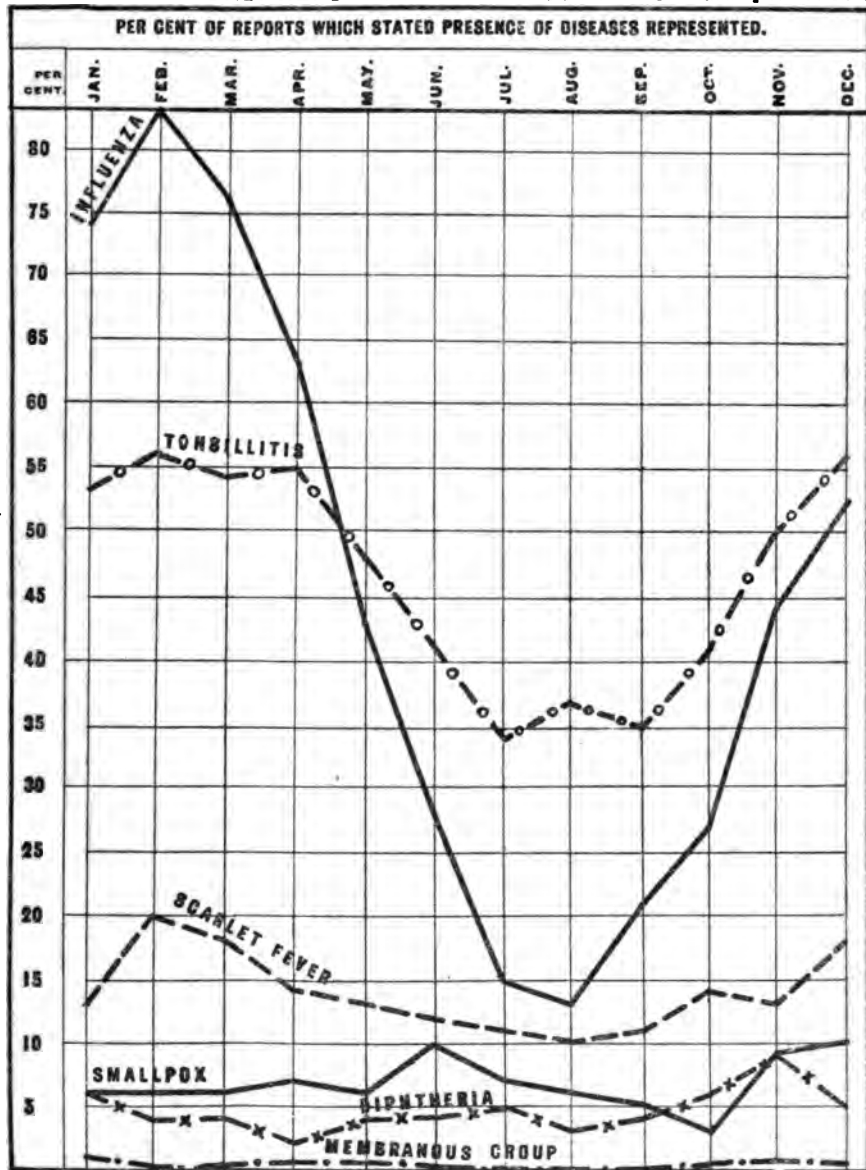
86 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902]

DISEASES IN MICHIGAN, ARRANGED IN ORDER OF PREVALENCE, THOSE WHICH CAUSED MOST SICKNESS FIRST.

TABLE 7.—Order of prevalence of 28 diseases in Michigan, in the period of 11 years, 1891-1901, and in each of those years, judging from the "per cent of reports," which stated the presence of each of the diseases, in connection with the reported "order of prevalence" when and where each disease was present. The diseases are arranged in the order of greatest prevalence in the 10 years, 1891-1900. (The method of rating diseases for this table is described and illustrated in a "compiling table" on pages 122 and 123 of the annual report for 1890.)

Order, 1891-1900.	Diseases arranged in order of greatest prevalence.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.
1	Rheumatism.....	1	1	1	1	1	1	3	1	1	2	2
2	Neuralgia.....	3	2	3	3	3	2	1	2	2	1	3
3	Influenza.....	2	3	2	2	2	3	2	4	3	4	1
4	Bronchitis.....	4	4	4	4	4	4	4	3	4	3	4
5	Diarrhea.....	6	5	6	5	6	6	5	5	6	5	5
6	Tonsillitis.....	5	6	5	6	5	5	6	6	5	6	6
7	Intermittent fever.....	10	11	9	8	10	8	7	8	7	7	8
8	Consumption, pulmonary....	8	9	7	10	11	7	10	7	8	9	7
(9)	(The average disease).....	8	10	8	9	10	7	8	9	10	9	10
9	Whooping-cough.....	14	7	10	9	8	11	8	10	11	10	10
10	Measles.....	9	8	8	11	7	14	18	11	10	16	11
11	Remittent fever.....	19	17	19	12	20	9	9	9	9	8	9
12	Cholera morbus.....	11	12	12	23	14	12	11	12	13	14	12
13	Cholera infantum.....	16	13	17	14	13	17	12	15	15	15	15
14	Dysentery.....	17	16	11	15	16	13	13	13	17	17	17
15	Pneumonia.....	15	20	16	18	18	10	16	16	12	11	13
16	Inflammation of kidney.....	18	18	14	17	21	16	14	17	16	12	14
17	Typhoid fever (enteric).....	13	10	13	16	25	19	17	18	14	20	16
18	Scarlet fever.....	7	14	18	13	19	18	19	14	19	13	22
19	Typho-malarial fever.....	26	19	15	24	12	21	20	23	22	22	20
20	Pleuritis.....	21	21	20	19	26	15	21	22	20	19	18
21	Smallpox.....	12	15	28	7	9	28	15	26	28	28	28
22	Diphtheria.....	23	25	24	22	15	24	27	19	18	18	23
23	Erysipelas.....	25	26	23	20	22	20	23	21	21	21	19
24	Inflammation of bowels.....	24	24	21	21	23	22	22	20	23	23	21
25	Puerperal fever.....	20	23	25	25	24	23	24	24	24	26	25
26	Meningitis.....	22	27	22	26	28	25	25	25	27	24	27
27	Membranous croup.....	28	28	27	23	17	26	28	27	25	27	24
28	Inflammation of brain.....	27	22	26	27	27	27	26	28	26	25	26

DIAGRAM 2—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1901.



Diseases which cause most sickness in Michigan.—This is shown in this report in Table 7, and more specifically in Table 9, in this report, and in similar tables or “exhibits” in previous reports. The question is differently answered in different years. For many years after the compilation of weekly reports was begun, intermittent fever appeared to be the leading cause of sickness in Michigan.

By Table 7, one may see that in the year 1891 influenza, in 1892 neuralgia, in 1893-94 rheumatism, in 1895 neuralgia, and in 1896-1901 rheumatism appeared to have caused most sickness in Michigan. This does not necessarily imply that there was an increase in rheumatism or neuralgia, because one disease *may* exhibit a higher relative order of prevalence on account of some other disease or diseases having been actually lessened in prevalence.

The “average disease” of those reported, is included in Table 7, as a standard by which to judge the fluctuations. It may be seen that in 1891, the “average disease” was lower (10) by one-tenth, than the average (9) of a series of years; in 1892 it was raised to the average; in 1893 it was one-tenth lower than the average; in 1894 it was raised to the average; in 1895 it was one-tenth higher, and in 1896 it was two-tenths higher than the average; in 1897 it was one-tenth lower than the average; in 1898 it was raised to the average; in 1899 it was one-tenth higher than the average; in 1900 it was one-tenth lower than the average, and in 1901 it was two-tenths higher than the average.

In this connection it should be stated that the average number of diseases reported on each card show an almost continuous decrease during the years 1891-1901. This is shown in Table 8, as follows:—

TABLE 8.—*Stating for each of the 11 years, 1891-1901, the number of card reports received, the total number of disease reports and the average number of diseases reported on each card; also the average for the 10 years, 1891-1900.*

Year.	Number of card reports received.	Number of disease reports.	Av. number of diseases on each card.
1891.....	4,291	28,741	6.70
1892.....	5,281	31,269	5.92
1893.....	5,853	32,723	5.59
1894.....	5,572	30,619	5.50
1895.....	4,394	24,004	5.46
1896.....	3,940	19,443	4.93
1897.....	4,418	21,828	4.94
1898.....	5,219	24,946	4.78
1899.....	5,126	24,700	4.82
1900.....	5,513	28,463	5.34
Average for the 10 years, 1891-1900.....	4,961	26,674	5.38
1901.....	5,850	28,941	4.95

TABLE 9.—*Diseases from which there seems to have been the most sickness in Michigan in 1901, as indicated by the per cent of weekly reports stating presence of the diseases, as studied in connection with the average order of prevalence of said diseases when reported present; also order, per cent of reports and average order for the same diseases in 1900, 1899, 1898, and 1897.*

		1901.			1900.			1899.			1898.			1897.		
		Order.*	Diseases in order of apparent amount of sickness in 1901. Most prevalent disease first.		Per cent of reports stating presence of, d. Av. order of prevalence when present. e	Order.*	Per cent of reports stating presence of, d Av. order of prevalence when present. e		Order.*	Per cent of reports stating presence of, d Av. order of prevalence when present.		Order.*	Per cent of reports stating presence of, d Av. order of prevalence when present. e		Order.*	Per cent of reports stating presence of, d Av. order of prevalence when present. e
More sickness than av. for 28 diseases.	1	Rheumatism.....	61	2.3	1	63	2.3	1	63	2.2	1	62	2.2	1	66	2.3
	2	Influenza.....	44	1.9	3	40	2.1	2	42	1.7	2	45	1.7	2	47	1.8
	3	Neuralgia.....	57	2.5	2	56	2.5	3	56	2.4	3	54	2.3	3	58	2.4
	4	Bronchitis.....	50	2.6	4	49	2.6	4	50	2.5	4	49	2.5	4	50	2.6
	5	Tonsillitis.....	46	2.9	6	45	2.9	5	42	2.7	6	40	2.7	5	43	2.6
	6	Diarrhea.....	36	2.6	5	40	2.4	6	37	2.5	5	36	2.4	6	34	2.5
	7	Scarlet fever.....	14	2.7	14	12	3.0	18	8	3.1	13	5	2.7	19	4	3.0
	(8)	Average.....	18	2.9	(10)	18	2.8	(8)	17	2.8	(9)	17	2.6	(10)	18	2.7
Less than said average.	8	Consumption, pulmonary...	22	3.1	9	25	3.0	7	22	2.9	10	20	2.9	11	20	3.1
	9	Measles.....	5	2.5	8	13	2.4	8	6	2.3	11	7	2.7	7	13	2.3
	10	Intermittent fever.....	14	3.0	11	16	2.9	9	17	2.9	8	19	2.6	10	17	2.7
	11	Cholera morbus.....	10	2.9	12	14	2.9	12	10	2.9	23	12	2.7	14	10	3.0
	12	Smallpox.....	7	2.8	15	1	2.7	28	4	4.7	7	.04	2.0	9	.05	2.0
	13	Typhoid fever (enteric)....	13	3.1	10	15	2.8	13	9	2.9	16	8	2.9	25	7	3.3
	14	Whooping-cough.....	5	2.8	7	5	2.5	10	4	2.3	9	5	2.4	8	4	2.1
	15	Pneumonia.....	20	3.5	20	16	3.6	16	17	3.5	18	17	3.2	18	19	3.4

*Judging from the per cent of reports which stated presence of the disease in connection with the order of prevalence when present. The method of rating diseases, as causes of sickness, is fully described and illustrated by a "compiling table" on pages 122 and 123 of the annual report for the year 1890.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received, for the time specified, from all observers in the State. It combines and states in a general way, an idea of the time a disease was prevalent, with an idea of the area of its prevalence.

e The disease having the greatest number of cases was to be marked 1, in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals of the order of prevalence columns in Table 3 (omitted from this report because of lack of room), by the number of observers who reported the disease present. The column is, therefore, an average, not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "average" lines for this column are found by dividing the sum of the totals in the order of prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of observers, who reported the different diseases present, thus counting each observer once for every disease he reported present. As a rule, small numbers in this column indicate the large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present, by each observer, from week to week, the greater will be the average in this column.

90 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 10.—In each of 11 geographical divisions of the State the 15 diseases from which there seems to have been the greatest amount of sickness in 1901, as indicated by the per cent of weekly reports stating presence of each of 23 leading diseases, when studied in connection with the average order of prevalence of said diseases when reported present.

	Order.*	Diseases in order of apparent amount of sickness. Most prevalent disease first.			Diseases in order of apparent amount of sickness. Most prevalent disease first.			Diseases in order of apparent amount of sickness. Most prevalent disease first.			Diseases in order of apparent amount of sickness. Most prevalent disease first.			
			Per cent of reports stating presence of. d	Av. order of prevalence when present. e		Per cent of reports stating presence of. d	Av. order of prevalence when present. e		Per cent of reports stating presence of. d	Av. order of prevalence when present. e		Per cent of reports stating presence of. d	Av. order of prevalence when present. e	
More sickness than av. for 23 diseases.		UPPER PENINSULAR DIVISION.†			NORTHWESTERN DIVISION.†			NORTHERN DIVISION.†						
	1	Scarlet fever.....	40	1.9	Rheumatism.....	77	2.7	Rheumatism.....	67	2.2				
	2	Rheumatism.....	45	2.5	Bronchitis.....	69	2.8	Neuralgia.....	63	2.4				
	3	Diarrhea.....	37	2.0	Neuralgia.....	65	3.0	Bronchitis.....	53	2.4				
	4	Bronchitis.....	37	2.1	Influenza.....	50	2.6	Influenza.....	36	1.5				
	5	Tonsillitis.....	43	2.6	Scarlet fever.....	26	1.8	Tonsillitis.....	54	2.5				
	6	Influenza.....	29	1.7	Tonsillitis.....	59	3.6	Diarrhea.....	34	2.1				
	7	Consumption, pul..	40	2.7	Diarrhea.....	41	3.6	Dysentery.....	21	2.3				
	8	Typhoid fev. (ent.)	26	2.6	Consumption, pul..	38	3.5	Smallpox.....	12	1.9				
	9	Typho-mal. fever..	2	1.0	Intermittent fever	17	2.9	Measles.....	9	1.5				
	(10)	.....	.....	.....	.....	.....	.....	Average.....	19	2.5			
	10	Measles.....	13	2.3	Pneumonia.....	34	3.7	Whooping-cough	7	2.0				
	11	Neuralgia.....	22	2.9	Puerperal fever..	1	2.5	Pneumonia.....	25	3.0				
	(12)	Average.....	16	2.6	Average.....	23	3.4	.....	.....	.....	
	Less than said average.	12	Whooping-cough..	10	2.5	Remittent fever..	5	3.0	Pleuritis.....	33	3.5			
13		Smallpox.....	16	2.9	Smallpox.....	8	3.2	Remittent fever..	12	2.5				
14		Pneumonia.....	19	3.2	Measles.....	3	3.0	Cholera infantum	10	2.4				
15		Intermittent fever	2	2.0	Typhoid fev. (ent.)	18	3.7	Diphtheria.....	4	2.1				
.....					
More sickness than av. for 23 diseases.		NORTHERN CENTRAL DIVISION.†			WESTERN DIVISION.†			NORTHEASTERN DIVISION.†						
	1	Rheumatism.....	40	2.1	Rheumatism.....	63	2.0	Influenza.....	63	1.2				
	2	Bronchitis.....	41	2.6	Influenza.....	61	2.0	Rheumatism.....	87	2.4				
	3	Neuralgia.....	40	2.7	Neuralgia.....	65	2.2	Neuralgia.....	83	2.8				
	4	Intermittent fever	25	1.9	Bronchitis.....	54	2.7	Bronchitis.....	78	2.8				
	5	Diarrhea.....	30	2.6	Tonsillitis.....	47	2.7	Tonsillitis.....	82	3.6				
	6	Influenza.....	26	2.5	Scarlet fever.....	9	1.7	Inflam. of kidney	65	3.4				
	7	Consumption, pul..	2	2.0	Smallpox.....	8	1.9	Remittent fever..	19	2.5				
	8	Tonsillitis.....	26	3.6	Diarrhea.....	32	2.7	Meningitis.....	1	2.0				
	(9)	.....	.....	.....	Average.....	18	2.5	.....	.....	.....	
	9	Smallpox.....	10	2.6	Typho-mal. fever..	2	1.9	Consumption, pul..	1	2.0				
	10	Typhoid fev. (ent.)	11	2.7	Measles.....	2	2.0	Pleuritis.....	53	4.3				
	(11)	Average.....	12	2.9	.....	.....	.....	Average.....	26	3.2			
	Less than said average.	11	Cholera infantum..	4	2.6	Consumption, pul	13	2.3	Diphtheria.....	8	2.5			
		12	Puerperal fever..	2	2.5	Intermittent fever	17	2.5	Pneumonia.....	34	3.6			
13		Meningitis.....	1	2.7	Diphtheria.....	5	2.3	Diarrhea.....	42	4.0				
14		Pneumonia.....	11	3.4	Whooping-cough..	5	2.3	Cholera morbus..	6	2.7				
15		Scarlet fever.....	8	3.4	Remittent fever..	16	2.7	Cholera infantum..	8	2.8				
.....					

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1901. 91

TABLE 10.—CONCLUDED.

	Order.*	Diseases in order of apparent amount of sickness. Most prevalent disease first.		Per cent of reports stating presence of. d		Av. order of prevalence when present. e		Diseases in order of apparent amount of sickness. Most prevalent disease first.		Per cent of reports stating presence of. d		Av. order of prevalence when present. e		Diseases in order of apparent amount of sickness. Most prevalent disease first.		Per cent of reports stating presence of. d		Av. order of prevalence when present. e	
More sickness than av. for 24 diseases.		BAY AND EASTERN DIVISION.†						CENTRAL DIVISION.†						SOUTHWESTERN DIVISION.†					
	1	Influenza.....	41	1.9				Rheumatism	60	2.3			Rheumatism	67	2.3				
	2	Rheumatism.....	50	2.6				Neuralgia	59	2.4			Neuralgia	63	2.5				
	3	Neuralgia	47	2.4				Influenza	43	2.0			Influenza	52	1.9				
	4	Bronchitis.....	43	2.6				Bronchitis.....	46	2.6			Diarrhea.....	44	2.6				
	5	Tonsillitis.....	37	3.1				Tonsillitis.....	42	2.9			Bronchitis.....	49	3.1				
	6	Diarrhea.....	37	2.6				Consumption, pul..	40	2.9			Tonsillitis.....	48	3.1				
	7	Pneumonia.....	22	3.5				Diarrhea.....	34	2.7			Intermittent fever..	33	2.9				
	(8)	Average.....	15	3.2				Average.....	18	2.9			Average.....	18	3.1				
	8	Cholera morbus.....	7	2.7				Measles.....	9	2.4			Cholera morbus.....	15	2.9				
	9	Cholera infantum.....	8	2.9				Pneumonia.....	20	3.3			Measles.....	8	2.6				
	10	Typhoid fev. (ent.)	10	3.1				Typhoid fev. (ent.)	15	3.0			Inflam. of brain.....	2	2.0				
	11	Inflam. of kidney..	19	4.1				Smallpox.....	8	2.5			Cholera infantum.....	10	3.1				
	12	Whooping-cough.....	2	3.0				Membranous croup.....	1	2.0			Puerperal fever.....	2	2.4				
	13	Scarlet fever.....	12	3.8				Inflam. of kidney..	20	3.7			Whooping-cough.....	8	3.0				
	14	Intermittent fever	12	3.8				Intermittent fever	12	3.2			Typho-mal. fever.....	2	2.5				
	15	Pleuritis.....	18	4.3				Cholera morbus...	13	3.3			Dysentery.....	9	3.2				
Less.		SOUTHERN CENTRAL DIVISION.†						SOUTHEASTERN DIVISION.†											
	1	Neuralgia.....	71	2.4				Rheumatism.....								54	2.1		
	2	Rheumatism.....	71	2.4				Neuralgia.....								49	2.2		
	3	Influenza.....	55	1.8				Bronchitis.....								41	2.3		
	4	Bronchitis.....	60	2.5				Diarrhea.....								37	2.2		
	5	Tonsillitis.....	59	2.7				Influenza.....								29	1.8		
	6	Diarrhea.....	40	2.4				Tonsillitis.....								33	2.5		
	(7)	Average.....	19	2.8															
	7	Inflam. of brain.....	6	2.0				Scarlet fever.....								15	2.1		
	8	Consumption, pul..	22	3.1				Inflammation of kidney.....								29	2.9		
	9	Cholera morbus.....	13	2.8				Whooping-cough.....								4	1.6		
	10	Measles.....	6	2.8				Measles.....								5	1.7		
	11	Scarlet fever.....	8	2.9				Typhoid fever (enteric).....								12	2.1		
	12	Dysentery.....	9	3.0				Consumption, pulmonary.....								14	2.3		
	13	Inflam. of bowels..	12	3.2				Pneumonia.....								17	2.5		
	(14)							Average.....								15	2.4		
	14	Inflam. of kidney..	20	3.6				Cholera morbus.....								6	2.3		
	15	Pleuritis.....	17	3.5				Intermittent fever.....								11	2.7		

*. d, e. Foot-notes with these marks are under Table 9.
†The counties in each division are shown on maps of the State, on pages 201 and 217 of the report of this Board for 1886.

TABLE 11.—Showing comparisons between the averages of certain meteorological conditions at stations in Michigan in 1901, with those in preceding years. (Abstracted from the article on Principal Meteorological Conditions in Michigan, on preceding pages of this report.)

Meteorological conditions.	Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average temperature.....													
In 1901 higher than av. for 10 years, 1891-1900.....		1.21		1.53	.13		.02	4.15	.45		.85		
Lower.....	.37		5.79			1.85				.38		1.06	3.65
Av. daily range of temp.....													
In 1901 greater than av. for 10 years, 1891-1900.....			.50								2.24		.04
Less.....	.59	.34		.99	.76	1.59	1.15	.91	2.21	1.50		.45	
Absolute humidity.....													
In 1901 more than av. for 10 years, 1891-1900.....		.04	.06	.06			.01	.76	.17				
Less.....			.52		.18	.28				.08	.03	.22	.18
Relative humidity.....													
In 1901 more than av. for 10 years, 1891-1900.....	1					3	2	2	3				1
Less.....		2	5		2					8	1	2	
Cloudiness.....													
In 1901 greater than av. for 10 years, 1891-1900.....	1	3		11		8			8	2			
Less.....			7				1	1			10	1	4
Rainfall.....													
In 1901 more than av. for 10 years, 1891-1900.....				.47				1.57	.10		.87		.25
Less.....	2.14	.55	.66		.67	.79	.59			.37		1.60	
Day ozone.....													
In 1901 more than av. for 10 years, 1891-1900.....	.10			.22	.02	.41	.57	.74	.64	.28			
Less.....		.08	.01								.06	.01	.38
Night ozone.....													
In 1901 more than av. for 10 years, 1891-1900.....	.33	.38		.34		.74	.74	.90	.75	.43	.24		
Less.....			.18		.12							.03	.24
Velocity of wind.....													
In 1901 greater than av. for 10 years, 1891-1900.....	.5	1.3		2.0			.3	.9	.1	.7	1.4	.9	
Less.....					.3								1.1
Atmospheric pressure.....													
In 1901 greater than av. for 10 years, 1891-1900.....	.034	.029	.053		.133		.033	.022	.070	.054	.160	.070	.018
Less.....				.119		.020							

CLIMATE AND SICKNESS.*

Table 12 (and similar tables or "exhibits" in previous reports) is an attempt to learn something of the relations of bronchitis to meteorological conditions, by noting whether each meteorological condition was above or below its average for the year, in months when more or in months when less bronchitis than the average for the year was reported. The months are arranged in order according to the prevalence of bronchitis; those months in which most bronchitis was reported being placed first in the column; those in which more bronchitis than the average was reported are placed above the average line; the others below that line. The meteorological conditions for each month are printed, in the proper columns, in the line for the month. The statements being thus arranged, it is easy to see whether the temperature, the velocity of the wind, or any other condition represented, was above its annual average in months when more than the average amount of bronchitis was reported, or *vice versa*.

That the comparisons may the more readily be held in mind, propositions have been made concerning the relations of bronchitis to meteorological conditions, grouping the conditions into two classes. The letters *a* and *b* in the table mark exceptions to these propositions. It is not supposed that the propositions are in every case true concerning the disease; but the propositions serve to bring out the evidence of the table on the subject in question. This evidence is appreciated by noting the number and force of the exceptions to the propositions, and also whether the exception is explained by facts shown in other columns. A summary of the evidence is presented in Table 15, near the close of this article.

Propositions similar to those relative to bronchitis, but relating to other diseases, are given on following pages. The propositions are differently stated for the summer diseases and for the winter diseases, but they are not changed to fit the individual diseases under each class.

*Relations of bronchitis and other "cold-weather" diseases to meteorological conditions.**

PROPOSITION 1.—That in months when more than the average per cent of weekly reports stated the presence of bronchitis, pneumonia, membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption, meningitis, erysipelas, inflammation of kidney, puerperal fever, smallpox, or average disease, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were greater than the average for the year; and in months when less than the average per cent of reports stated the presence of bronchitis (or of the other diseases named), these conditions were less than the average for the year. In Table 12, the letter *a* marks exceptions to this proposition relating to bronchitis for the year 1901.

*A comparison of meteorological conditions in 1901, with the averages for series of years, is given on a preceding page of this article.

PROPOSITION 2.—That in months when more than the average per cent of weekly reports stated the presence of bronchitis, pneumonia, membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption, meningitis, erysipelas, inflammation of kidney, puerperal fever, smallpox, or average disease, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere and the average daily pressure of the atmosphere were less than the average for the year; and in months when less than the average per cent of reports stated the presence of bronchitis (or of the other diseases named), these conditions were greater than the average for the year. In Table 12, the letter *b* marks exceptions to this proposition relating to bronchitis for months in 1901.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to proposition 2, it is true also that the quantity of vapor inhaled daily was less than the average, and the quantity exhaled daily in excess of that inhaled was greater than the average in months where more than the average per cent of reports stated presence of bronchitis, or of the other diseases named in propositions 1 and 2; and that more vapor was inhaled and a less excess exhaled daily in months when the per cent of reports stating presence of bronchitis, or of the other diseases named in propositions 1 and 2, was less than the average.

What per cent of the weekly reports received stated presence of the diseases mentioned in the preceding propositions by months in the years 1891-1901, is stated in Tables 13 and 17, on subsequent pages of this article.

For the preparation of Tables 15 and 16 in this article, tables similar to Table 12 relating to bronchitis have been prepared for the other twenty-seven diseases which are considered in this article, and also for the average disease, but, on account of lack of space, are not printed.

TABLE 12.—BRONCHITIS.—*Stating for the year and for each month of the year 1901, what per cent of the weekly reports of sickness stated presence of bronchitis and what were the meteorological conditions as observed at stations in Michigan.**

Bronchitis.		Tempera- ture, F.		Humidity of air.‡ Av. of 3 daily ob- servations.		Vapor inhaled and exhaled from the air passages by one per- son in 24 hours, troy ounces.		Average per cent of cloudiness.		Ozone, relative. Scale of 10 ⁵ .		Av. velocity of wind, miles per hour by anemometer.		A atmospheric pressure, inches. Reduced to 32° F.		
Months in order of greatest per cent of weekly reports stating presence of.	Per cent of weekly reports stating presence of.									Av. order of prevalence where present.†,†	Av. daily range by reg- istering thermometers.			Average of three daily observations.	Relative per cent of saturation.	Absolute—grains of vapor in a cubic foot of air.	Inhaled.‡	Exhaled in ex- cess of that inhaled.‡	Day observation, 7 A. M. to 2 P. M.	Night observations, 9 P. M. to 7 A. M.	Range.		Average pressure.
		Monthly and for year.	Av. daily by 3 daily observa- tions.‡‡													
More than av. per cent of bronchitis.	March....	63	2.8	15.73	31.81	80	1.91	1.19	10.49	68	4.45	4.98	13.3	.931	.329	28.980
	April....	60	2.5	178.00	46.34	a 71	2.83	1.77	9.91	a 52	a 3.79	a 4.25	a 10.2	.968	a .173	b 29.240
	Feb.....	59	2.7	16.32	16.66	78	.95	.59	11.09	60	4.14	4.41	11.0	.883	.194	29.132
	Dec.....	58	2.1	12.87	24.36	84	1.58	.99	10.69	68	a 3.20	a 3.85	a 10.1	.883	.229	29.110
	Jan.....	58	2.6	14.00	24.11	82	1.43	.89	10.79	75	3.96	4.38	12.0	1.316	.280	29.109
	Nov.....	54	2.3	13.25	35.09	80	2.13	1.33	10.35	71	a 3.29	a 3.61	11.9	.928	.21	b 29.182
	May.....	52	2.4	b 18.63	55.28	a 76	b 3.91	2.44	9.24	59	4.50	5.27	a 9.3	a .798	a .159	29.044
	Av.....	50	2.6	17.30	46.72	78	3.51	2.19	9.49	56	3.89	4.38	10.3	.810	.177	29.134
Less than av. per cent of bronchitis.	June....	47	2.6	20.24	67.96	75	5.76	3.60	8.08	41	a 4.29	a 4.99	8.3	.502	.101	b 29.116
	Oct.....	46	2.4	20.24	51.30	76	3.56	2.23	9.35	41	3.18	3.65	a 11.0	a 1.006	a .187	29.198
	Sept....	43	3.0	19.06	62.48	78	5.01	3.13	8.55	44	3.39	3.73	9.6	.742	.159	29.200
	July.....	34	2.7	20.42	75.31	74	6.86	4.29	7.39	38	a 3.90	a 4.48	8.8	.400	.103	b 29.122
	Aug.....	32	3.1	18.82	70.00	77	6.13	3.83	7.25	48	4.02	a 4.92	7.6	.438	.097	29.171

*Statements relative to meteorological conditions may be found in an article on the principal meteorological conditions in Michigan in 1901, on preceding pages of this report.

†Explanations of statements in this and the preceding columns, and other statements relative to the prevalence in 1901, of the diseases under consideration, may be found in Tables 5 and 6 of this article, and also in Diagrams 1, 2, 3, 4 and 5. When the per cent of reports stated for any disease is the same for two months or for any month is the same as the average, the order of months in the first column of these exhibits has been determined by reference to fractional per cents.

‡Small numbers in this column indicate great prevalence in the localities where the disease occurred, as compared with other diseases; and large numbers a less prevalence.

§Calculated from readings of dry bulb and wet bulb thermometers.

||Calculated for 18 respirations per minute, of 20 cubic inches of air each.

¶Assuming the air exhaled to be saturated with vapor at the temperature of 98° F., in which case each cubic foot of air contains 18.69 grains of vapor, and 18 respirations per minute, of 20 cubic inches of air each, make 11.68 troy ounces of vapor exhaled daily. No correction has been made for the expansion of air after it is inhaled.

**The daily range from which numbers in this column were computed is the difference between the highest and the lowest of the four observations taken during the 24 hours, namely, at 7 a. m., 2 p. m., 9 p. m. of one day, and 7 a. m. of the following day.

αAn exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was greater than the average for the year; and less in months when the same condition was less than the average. Proposition 1, relating to bronchitis and other "cold-weather" diseases, is on a preceding page in this article.

βAn exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was less than the average for the year, and less in months when the same condition was greater than the average for the year. Proposition 2, relating to bronchitis and other "cold-weather" diseases, is on a preceding page in this article.

TABLE 13.—By year and months for 1901, and for the preceding year, and an average for the 10 years, 1891-1900, stating on what per cent of the weekly reports received PNEUMONIA, MEMBRANOUS CROUP, DIPHTHERIA, RHEUMATISM, INFLUENZA, SCARLET FEVER, NEURALGIA, TONSILLITIS, BRONCHITIS, INFLAMMATION OF KIDNEY, MENINGITIS, PLEURITIS, CONSUMPTION, PUERPERAL FEVER, ERYSIPELAS AND SMALLPOX, were reported present; and comparing the per cents for months in 1901 with the averages for corresponding months in the years specified. (The per cent of increase or decrease of any disease in 1901, when compared with the average for the preceding 10 years, may be found by multiplying the difference by 100, and dividing the product by the figure representing the average.)

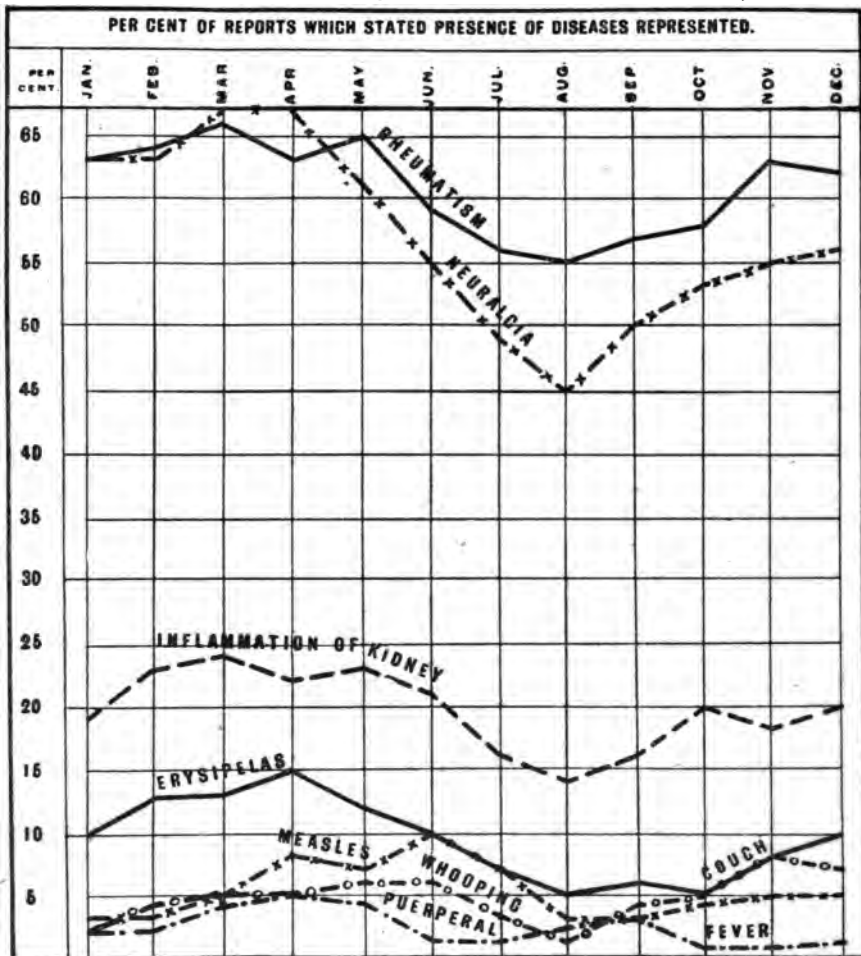
Years, etc.	Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.		Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	
Pneumonia.	Av. 10 years, 1891-1900.....	20	38	39	36	31	21	11	7	5	7	11	18	35	Membranous group.	2	3	3	2	2	2	7	4	7	1	2	2	
	1900.....	16	23	33	33	25	19	7	5	4	5	7	16	23		4	1	2	0	0	4	0	2	2	5	5	1	2
	1901.....	20	30	30	37	32	24	16	4	3	5	12	17	21		4	1	4	4	5	5	0	0	0	5	7	3	3
	In 1901 greater than av. 1891-1900.....	—	—	—	1	1	3	5	—	—	—	1	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
	In 1901 less than av. 1891-1900.....	—	8	—	—	—	—	—	3	2	2	—	1	4		1.6	2	2.6	1.6	1.5	1.5	.7	.7	.4	.7	.5	1.3	1.4
Diphtheria.	Av. 10 years, 1891-1900.....	5	7	5	5	4	4	5	4	4	5	7	8	7	Rheumatism.	63	67	66	69	69	66	62	59	56	58	62	63	65
	1900.....	4	3	2	2	1	3	4	2	2	4	6	9	6		63	68	66	71	66	68	67	59	57	61	59	60	63
	1901.....	5	6	4	4	2	4	4	5	3	4	6	9	5		61	63	64	66	63	65	59	56	55	57	58	63	62
	In 1901 greater than av. 1891-1900.....	—	—	—	—	—	—	—	1	—	—	—	1	—		—	—	—	—	—	—	—	—	—	—	—	—	—
	In 1901 less than av. 1891-1900.....	—	1	1	1	2	—	1	—	1	1	—	2	—		2	4	2	3	6	1	3	3	1	1	4	—	3
Influenza.	Av. 10 years, 1891-1900.....	44	72	75	71	64	43	37	19	18	24	29	43	59	Scarlet fever.	9	12	10	10	12	10	9	7	6	8	9	11	11
	1900.....	40	60	61	65	63	41	29	19	17	26	29	36	52		12	16	13	9	12	11	11	9	10	10	13	17	15
	1901.....	44	74	83	76	63	43	28	15	13	21	27	44	52		14	13	20	18	14	13	12	11	10	11	14	13	18
	In 1901 greater than av. 1891-1900.....	—	2	8	2	—	—	—	—	—	—	—	—	—		5	1	10	8	2	3	3	4	4	3	5	2	7
	In 1901 less than av. 1891-1900.....	—	—	—	—	1	—	—	4	5	3	2	7	—		—	—	—	—	—	—	—	—	—	—	—	—	—
Neuralgia.	Av. 10 years, 1891-1900.....	57	63	64	66	63	59	54	50	49	51	56	59	59	Tonsillitis.	45	56	55	54	52	45	36	33	32	34	42	49	54
	1900.....	56	57	60	62	62	61	53	49	47	49	55	58	59		45	54	54	55	52	47	41	38	35	36	41	48	50
	1901.....	57	63	63	67	67	61	55	49	45	50	53	55	56		46	53	56	54	55	48	41	34	37	35	41	50	56
	In 1901 greater than av. 1891-1900.....	—	—	—	1	4	2	1	—	—	—	—	—	—		1	—	1	—	3	3	5	1	5	1	—	1	2
	In 1901 less than av. 1891-1900.....	—	1	—	—	—	—	—	1	4	1	3	4	3		—	3	—	—	—	—	—	—	—	—	1	—	—
Bronchitis.	Av. 10 years, 1891-1900.....	52	65	65	64	63	52	43	36	36	41	48	55	60	Inflam. of kidney.	18	20	20	20	22	21	19	18	16	15	17	19	18
	1900.....	49	57	64	65	63	53	41	36	32	37	43	51	57		20	23	22	22	23	24	21	22	18	17	17	21	16
	1901.....	50	58	59	63	60	54	47	34	32	43	46	54	58		20	19	23	24	22	23	21	16	14	16	20	18	20
	In 1901 greater than av. 1891-1900.....	—	—	—	—	—	4	—	—	—	2	—	—	—		2	—	3	4	—	2	2	—	—	1	3	—	2
	In 1901 less than av. 1891-1900.....	2	7	6	1	3	—	—	2	4	—	2	1	2		—	1	—	—	—	—	2	2	—	—	—	—	1

TABLE 13.--CONCLUDED.

Years.	Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	
Meningitis.	Av. 10 years, 1891-1900	2	1	2	2	2	2	2	2	2	1	1	1	Pleuritis.	16	24	24	24	23	18	13	11	8	11	12	16	19
	1900	1	1	2	1	2	2	2	2	1	1	2	2		16	21	24	23	23	20	15	10	10	12	11	12	20
	1901	1	1	1	1	2	2	1	1	1	1	0	2		17	19	27	23	23	19	15	11	7	9	13	16	23
	In 1901 greater than av. 1891-1900	1	1	1	1	1	1	1	1	1	1	1	1		1	3	1	1	1	2	1	1	1	1	1	4	
	In 1901 less than av. 1891-1900	1	1	1	1	1	1	1	1	1	1	1	1		5	1	1	1	1	1	1	1	2	1	1	1	
Consumption.	Av. 10 years, 1891-1900	30	31	30	31	33	31	30	31	29	29	28	28	Puerperal fever.	2	3	3	3	3	3	3	2	2	2	2	2	2
	1900	25	27	26	22	20	23	26	23	27	26	27	24		22	2	1	3	1	4	2	1	1	2	2	6	1
	1901	22	22	25	25	26	22	20	20	21	23	23	18		20	2	2	4	5	4	1	1	2	3	5	7	1
	In 1901 greater than av. 1891-1900	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	2	1	1	1	1	1	1	1	
	In 1901 less than av. 1891-1900	8	9	5	6	7	9	10	11	8	6	5	10		8	1	1	1	1	1	2	1	1	1	1	1	1
Erysipelas.	Av. 10 years, 1891-1900	13	15	16	16	15	14	12	10	10	11	13	15	Smallpox.	.7	.2	.5	.8	.6	.3	.4	.2	.1	.03	.3	.3	.5
	1900	10	13	11	11	10	11	10	11	8	10	9	9		1	0	0	.3	.9	.2	.2	1	.5	0	.9	.2	.5
	1901	9	10	13	13	15	12	10	7	5	6	5	8		.7	.6	.6	.6	.7	.6	10	.7	.6	.5	.3	.9	.10
	In 1901 greater than av. 1891-1900	1	1	1	1	1	1	1	1	1	1	1	1		6.3	5.8	5.5	5.2	6.4	5.7	9.6	6.8	5.9	4.97	2.7	8.7	9.5
	In 1901 less than av. 1891-1900	4	5	3	3	1	3	4	5	5	4	6	5		5	1	1	1	1	1	1	1	1	1	1	1	1

The lines for 1901 in Tables 13 and 14, relative to the twenty-eight diseases, are graphically represented in Diagrams 1, 2, 3, 4 and 5 of this article.

DIAGRAM 3—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1901



[PLATE 1135]

*Relations of diarrhea and other "warm-weather" diseases to meteorological conditions.**

PROPOSITION 1.—That in months when more than the average per cent of weekly reports stated the presence of diarrhea, cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, cholera morbus, dysentery, measles, whooping-cough, inflammation of brain, or inflammation of bowels, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea (or of the other diseases named), these conditions were **less** than the average for the year.

PROPOSITION 2.—That in months when more than the average per cent of weekly reports stated the presence of diarrhea, cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, cholera morbus, dysentery, measles, whooping-cough, inflammation of brain, or inflammation of bowels, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, and the monthly and average daily range of the barometer were **less** than the average for the year; and that in months when **less** than the average per cent of reports stated the presence of diarrhea (or of the other diseases named), these conditions were **greater** than the average for the year.

Explanations of propositions 1 and 2 are given on a preceding page, under the heading "Climate and Sickness."

A summary relative to the foregoing propositions, is presented in Table 16, near the close of this article.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to proposition 1, it is true, also, that the quantity of vapor inhaled daily was **greater** than the average, and the quantity exhaled daily in excess of that inhaled was **less** than the average in months when more than the average per cent of reports stated presence of diarrhea, or of the other diseases named in propositions 1 and 2; and that **less** vapor was inhaled and a **greater** excess exhaled daily in months when the per cent of reports stating presence of diarrhea, or of the other diseases named in propositions 1 and 2 was **less** than the average.

On what per cent of the weekly reports received, by months in the years 1891-1901, the twelve foregoing diseases were reported present, is stated in Table 14, on a subsequent page of this article.

The lines for 1901, relative to the twelve diseases, are graphically represented in Diagrams 1, 3, 4 and 5 in this article.

*A comparison of meteorological conditions in 1901, with the average for series of years, is given on a preceding page of this article.

100 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 14.—By year and months for 1901 and for the preceding year, and averages for the 10 years, 1891-1900, stating on what per cent of the weekly reports received DIARRHEA, CHOLERA INFANTUM, INTERMITTENT FEVER, REMITTENT FEVER, TYPHOID FEVER, TYPHO-MALARIAL FEVER, MEASLES, WHOOPING-COUGH, CHOLERA MORBUS, DYSENTERY, INFLAMMATION OF BRAIN AND INFLAMMATION OF BOWELS, were reported present, and comparing the per cents for 1901 with the averages for corresponding months in the years specified. (The per cent of increase or decrease of any disease in 1901, when compared with the average for the preceding 10 years, may be found by multiplying the difference by 100, and dividing the product by the figure representing the average.)

Years, etc.		Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Diarrhea.	Av. 10 years, 1891-1900	39	24	22	24	35	27	36	55	71	71	52	29	24	Cholera infantum.		10	1	1	.8	2	3	8	20	33	31	13	2	1
	1900	40	20	15	19	24	25	36	52	72	75	57	34	24			12	2	1	.8	3	2	9	17	36	43	13	2	.7
	1901	38	18	14	21	24	30	35	57	67	66	46	36	23			7	.9	.6	.4	.3	1	4	17	28	27	9	.4	.4
	In 1901 greater than av. 1891-1900						3		2																				
	In 1901 less than av. 1891-1900		3	6	8	3	2		1		4	5	6	3			3	.1	.4	.4	1.7	2	4	3	5	4	4	1.6	.6
Intermittent fever.	Av. 10 years, 1891-1900	22	17	16	17	21	22	23	25	28	28	26	22	17	Remittent fever.		17	14	13	12	14	15	16	19	21	23	23	18	16
	1900	16	12	12	12	13	15	15	12	18	23	24	19	13			11	9	7	1	10	8	9	9	11	14	18	15	15
	1901	14	12	7	12	14	15	15	16	17	19	16	14	10			9	7	5	6	7	9	8	8	14	16	12	9	6
	In 1901 greater than av. 1891-1900																												
	In 1901 less than av. 1891-1900		8	5	9	5	7	7	8	9	11	9	10	8			8	7	8	6	7	6	8	11	7	7	11	9	10
Typhoid fever.	Av. 10 years, 1891-1900	10	6	5	4	4	3	5	8	14	19	22	18	12	Typho-malarial fever.		3	2	1	2	1	1	1	3	5	6	7	5	3
	1900	15	6	5	5	6	2	4	11	16	27	33	32	13			3	.8	2	1	0	.8	2	4	6	4	4	5	2
	1901	13	20	10	9	10	5	4	7	19	23	23	14	11			1	2	2	.7	.3	1	2	1	6	1	2	2	2
	In 1901 greater than av. 1891-1900		3	14	5	5	6	2		5	4	1						1											
	In 1901 less than av. 1891-1900							1	1				4	1			2			1.3	.7		.8	2	4	5	5	3	1
Measles.	Av. 10 years, 1891-1900	8	6	9	13	16	17	15	8	4	2	2	2	4	Whooping-cough.		7	7	6	6	7	7	8	9	9	8	6	7	7
	1900	13	15	19	31	28	25	23	14	6	4	4	3	4			5	7	5	5	3	4	5	8	5	1	2	7	
	1901	5	3	3	5	8	7	10	7	3	3	4	5	5			5	2	4	5	5	6	6	3	1	4	5	8	7
	In 1901 greater than av. 1891-1900									1	2	3	1																
	In 1901 less than av. 1891-1900		3	3	6	8	8	10	5	1	1						2	5	2	1	2	1	2	6	8	4	1		
Cholera morbus.	Av. 10 years, 1891-1900	13	3	3	3	4	5	13	27	38	33	15	5	3	Dysentery.		14	5	4	5	5	5	9	19	35	37	22	7	4
	1900	14	3	1	3	3	4	11	23	39	39	20	5	2			14	4	3	2	3	5	9	18	36	42	22	6	3
	1901	10	2	3	2	2	5	7	21	29	29	11	4	1			9	4	3	3	4	4	5	15	26	25	13	6	3
	In 1901 greater than av. 1891-1900																												
	In 1901 less than av. 1891-1900		3	1		1	2	6	6	9	4	4	1	1			5	1	1	2	1	1	4	4	9	12	9	1	1
Inflam. of brain.	Av. 10 years, 1891-1900	2	2	3	3	3	3	3	2	2	2	2	2	2	Inflam. of bowels.		12	9	9	10	11	10	12	13	17	15	12	9	10
	1900	1	1	7	5	1	2	5	1	1	2	2	2	2			11	9	8	8	11	12	11	12	15	14	11	6	10
	1901	.9	2	1	1	0	.4	2	.4	1	.7	.2	.9	1			9	9	8	7	5	7	10	10	14	16	12	7	8
	In 1901 greater than av. 1891-1900																								1				
	In 1901 less than av. 1891-1900		1.1		2	2	3	2.6	1	2.6	1	1.3	1.8	1.1			3		1	3	6	3	2	3	3			2	2

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1901. 101

COLD-WEATHER DISEASES.

TABLE 15.—Summary relative to propositions on preceding pages concerning relations by months, in 1901, between greater or less than usual prevalence of diseases named and certain given coincident climatic conditions.

Diseases.	Months (inclusive) in which diseases named were more than usually prevalent in 1901.	Months (inclusive) in which diseases named were less than usually prevalent in 1901.	For the 12 months of the year 1901. Number of months in which propositions hold true.*												
			That in months when diseases named were more than usually prevalent the conditions named below were greater than usual, and in months when less than usually prevalent these condi- tions were less than usual.								That in mos. when diseases named were more than usually prevalent the conditions named below were lower than usual, and in months when the diseases were less than usually prevalent these conditions were higher than usual.				
			Relative humidity.	Av. percent of cloudiness.	Ozone.		Atmos- pheric pressure.	Range.	Average temperature.	Av. daily range of temp.	Average daily atmospheric pressure.	Absolute humidity.			
					Day.	Night.							Velocity of wind.	Monthly.	Av. daily.
Bronchitis.....	Jan.-May, Nov., Dec.	June-Oct.	10	11	6	6	8	10	9	11	10	8	11		
Pneumonia.....	Jan.-May, Dec.	June-Nov.....	9	10	7	7	7	9	8	10	9	9	10		
Membran. croup...	Jan., Apr., May, Oct.-Dec.	Feb., March, June-Sept.	8	8	3	3	7	9	8	8	7	5	8		
Diphtheria.....	Jan., July, Oct., Dec.	Feb. - June, Aug., Sept.	9	7	4	4	8	8	9	7	8	6	7		
Tonsillitis.....	Jan.-May, Nov., Dec.	June-Oct.....	10	11	6	6	8	10	9	11	10	8	11		
Influenza.....	Jan.-Apr., Dec.	May-Nov.....	10	9	6	6	8	10	9	11	10	8	11		
Scarlet fever.....	Feb.-Apr., Oct., Dec.	Jan., May- Sept., Nov.	8	7	4	6	8	10	9	9	8	6	9		
Rheumatism.....	Jan.-May, Nov., Dec.	June-Oct.....	10	11	6	6	8	10	9	11	10	8	11		
Neuralgia.....	Jan.-May.....	June-Dec.....	8	9	8	8	8	8	7	9	8	8	9		
Consumption, pul.	Feb. - April, Sept., Oct.	Jan., May-Aug., Nov., Dec.	7	5	4	5	8	8	7	7	6	4	7		
Pleuritis.....	Jan.-May, Dec.	June-Nov.....	9	10	7	7	7	9	8	10	9	9	10		
Inflam. of kidney..	Feb.-June, Oct., Dec.	Jan., July- Sept., Nov.	6	7	6	7	6	8	7	7	6	8	7		
Meningitis.....	Jan.-May, July, Dec.	June, Aug., Nov.	8	9	8	8	6	8	7	9	8	10	9		
Puerperal fever...	Mar.-May, Sept.	Jan., Feb., June- Aug., Oct.- Dec.	7	6	5	6	5	5	4	6	5	5	6		
Erysipelas.....	Jan.-June, Dec.	July-Nov.....	8	9	8	8	6	8	7	9	8	10	9		
Smallpox.....	June, July, Nov., Dec.	Jan.-May, Aug., Oct.	8	6	5	6	5	5	6	6	7	7	6		
Average disease...	Jan.-Apr., Dec.	May-Nov.	10	9	6	6	8	10	9	11	10	8	11		

*The figures in each of these eleven columns show for how many months out of the twelve months in 1901, the proposition named over the column holds true; thus, concerning bronchitis, the proposition relative to average daily range of temperature held true in ten months out of the twelve; that relative to average temperature, in eleven out of twelve, etc.

WARM-WEATHER DISEASES.

TABLE 16.—*Summary relative to propositions on preceding pages concerning relations by months, in 1901, between greater or less than usual prevalence of diseases named, and certain given coincident climatic conditions.*

Diseases.	Months (inclusive) in which diseases named were more than usually prevalent in 1901.	Months (inclusive) in which diseases named were less than usually prevalent in 1901.	For the 12 months of the year 1901. Number of months in which propositions hold true.*											
			That in months when diseases named were more prevalent than usual, the conditions named below were higher than usual; and in months when the diseases were less prevalent than usual, these conditions were lower than usual.				That in months when diseases named were more prevalent than usual, the conditions named below were less than usual; and in months when the diseases were less prevalent than usual, these conditions were greater than usual.							
			Average temperature.	Average daily range of temperature.	Absolute humidity.	Average daily atmos- pheric pressure.	Atmos- pheric pressure.		Relative humidity.	Average per cent of cloudiness.	Ozone.		Velocity of wind.	
							Range.				Day.	Night.		
							Monthly.	Av. daily.						
Diarrhea.....	July-Oct.....	Jan.-June, Nov. Dec.	10	9	10	9	9	8	9	10	7	7	7	
Cholera infantum...	July-Oct.....	Jan.-June, Nov. Dec.	10	9	10	9	9	8	9	10	7	7	7	
Intermittent fever	April-Nov.....	Jan.-Mar., Dec.	10	11	10	9	9	10	11	10	7	7	9	
Remittent fever...	Aug.-Nov.....	Jan.-July, Dec.	8	7	8	11	7	6	7	8	9	9	5	
Typhoid fev. (ent.)	Jan., Aug.-Nov.	Feb.-July, Dec.	7	6	7	10	6	5	6	7	8	9	4	
Typho-mal. fever..	Jan., Feb., Oct.- Dec.	March-Sept....	3	2	3	6	2	1	4	3	8	9	2	
Measles	Apr.-July, Nov., Dec.	Jan.-Mar., Aug.- Oct.	6	7	6	5	7	8	8	6	7	7	9	
Whooping-cough...	Mar.-June, Oct., Dec.	Jan., Feb., July- Sept.	5	6	5	6	4	5	7	5	8	8	6	
Cholera morbus ...	July-Oct.....	Jan.-June, Nov. Dec.	10	9	10	9	9	8	9	10	7	7	7	
Dysentery.....	July-Oct.....	Jan.-June, Nov. Dec.	10	9	10	9	9	8	9	10	7	7	7	
Inflam. of brain....	Jan.-Mar., June, Aug., Nov., Dec.	Apr., May, July, Sept., Oct.	3	2	3	4	4	3	4	3	4	5	4	
Inflam. of bowels..	June-Oct.....	Jan.-May, Nov., Dec.	11	10	11	8	10	9	10	11	6	6	8	

*The figures in each of these eleven columns show for how many months out of the twelve months in 1901 the proposition named over the column holds true; thus, concerning diarrhea, the proposition relative to average daily range of temperature held true in nine months out of the twelve; that relative to absolute humidity ten months out of the twelve, etc.

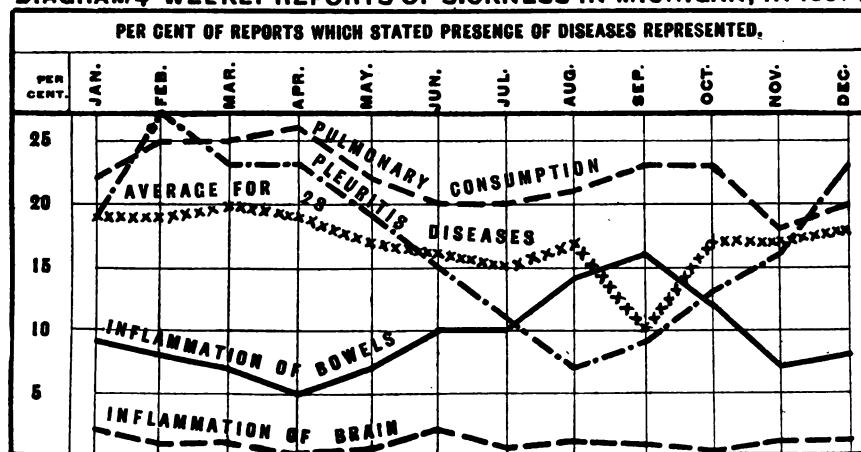
Total sickness—average disease.—"Average disease" is an average of the tabulated diseases reported present on all the cards received and compiled at this office during the year. It is probably equivalent to the actual sickness from all diseases printed on the report cards, and probably represents very nearly the average sickness from all the diseases in the State. A sample of the report cards on which diseases are reported to this office is shown on the third page of this article. Twenty-eight diseases are printed on the cards. In 1901 there were 5,850 of these card reports received. On some of the cards only one or two diseases

were reported present and on others more. Had each disease (printed on this card, and only the twenty-eight thus named) been reported present on every card received at this office, there would have been 163,800 reports of diseases present. (This is the product of 5,850 reports received multiplied by twenty-eight, the number of diseases printed on the cards, or 100 per cent of the possible disease reports.) There were actually present on the cards received at this office only 28,941 disease reports, which $28,941 \div 163,800$ of the possible disease reports that might have been present, is about 18 per cent. This 18 per cent represents the actual sickness in the State from the tabulated diseases reported present, or in other words the sickness from "average disease." This is shown, by months, in Diagram 4, on a preceding page.

Table 17 serves to indicate the probable actual sickness in the State from the tabulated diseases in the years 1891-1901. It compares the sickness, by months, in 1901 with the sickness in each of the ten years, 1891-1900, and indicates that the sickness reported in 1901 was, for the year, and for each month of the year, less than the average.

On this subject Tables 7 and 8, on preceding pages, and the accompanying remarks, may be studied in connection with the tables and remarks in this part of this article. In Table 7, the order of prevalence of each disease, including the "average disease," is shown as it appears after taking account of the order or prevalence of each disease in the places where it was present, and also the per cent of all reports received on which that disease was reported.

DIAGRAM 4- WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1901 .



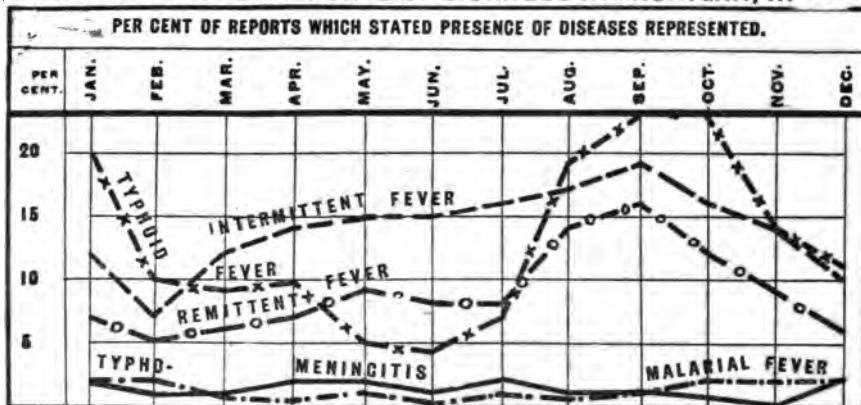
[PLATE 1136]

104 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 17.—SICKNESS FROM AVERAGE DISEASE, 1891-1901.—*By year and months for each of the years, 1891-1901, stating on an average for such of the 28 diseases tabulated as were reported present, what per cent of the weekly reports received stated presence of the diseases; and comparing the average per cents for months in 1901 with the averages for corresponding months in the 10 years, 1891-1900.*

Years, etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average 10 years, 1891-1900.....	19	20	20	21	20	18	17	18	20	21	20	19	19
1891.....	25	27	27	27	27	25	22	23	26	25	24	23	24
1892.....	21	26	25	24	24	20	19	19	22	23	22	20	23
1893.....	20	21	21	20	20	19	18	18	21	21	20	20	20
1894.....	20	20	19	20	20	19	18	18	20	22	20	19	19
1895.....	20	20	21	22	22	19	18	19	20	19	19	17	18
1896.....	18	19	19	20	17	16	16	17	18	18	17	17	17
1897.....	18	18	18	19	18	17	16	17	18	19	19	17	16
1898.....	17	17	18	17	18	15	14	15	18	18	18	17	18
1899.....	17	18	19	18	18	16	15	17	17	19	17	17	17
1900.....	18	18	19	19	19	18	16	17	19	21	19	18	18
1901.....	18	19	19	20	19	17	16	15	17	10	17	17	18
In 1901, less than average, 1891-1900.....	1	1	1	1	1	1	1	3	3	11	3	2	1

DIAGRAMS—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1901.



[PLATE 1137]

COMMUNICABLE DISEASES IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1901.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD
OF HEALTH.

This paper continues a subject treated for the preceding year on pages 105-254 of the Report of the State Board of Health for the year 1901, and for former years in previous reports.

Whenever information is received at this office that consumption, diphtheria, typhoid fever, scarlet fever, measles, whooping-cough, meningitis, smallpox, German measles (rötheln), rabies or glanders, is present, or has recently been present in any locality in Michigan, a letter is sent to the health officer of the township, city or village in which the disease is reported to be present (if the name of the health officer has been reported to this office; if not, to the president of the board of health), mentioning the reported existence of the disease within his jurisdiction, indicating his duties and powers and the proper measures to be taken in restricting the disease, transmitting documents of instruction relative to the prevention and restriction of the disease, for distribution among the neighbors of families in which the disease is present,* and asking for a report of the methods employed for the restriction of the disease, and the results of efforts for suppressing it, also the number of cases and deaths in each outbreak. With this letter in each instance, except in case of rabies and glanders, there was sent a blank form (L), or (S for consumption), for the notice of the first case of a dangerous communicable disease, and a blank form (M) for weekly reports during the continuance of the disease. After the outbreak was over, there was sent a blank form (K), (O), (Q), (R) or (U) for a special final report, for the purpose of learning what was done for the restriction and prevention of the disease, by way of isolation and disinfection; also whether or not disinfection was by fumes of burning sulphur or by formaldehyde, and whether either is efficient as a disinfectant, and what quantity of each is required to accomplish disinfection. The blank (K) is for diphtheria, scarlet fever, measles, whooping-cough and rötheln; the blank (O) is for typhoid fever; the blank (Q) for smallpox; the blank (R) for consumption and the blank (U) for meningitis. These blanks for special final reports have been especially prepared, and differ from each other, therefore should be used only for the disease for which each is prepared.

* It is believed that these documents distributed in this manner are doing great good: for the neighbors of the sick are sufficiently alarmed to read the documents, and are thus led to co-operate in stamping out the disease. Some evidence of the value of this work may be seen further on, in the several articles to which this is an introduction, in tables which show the estimated number of outbreaks of, and cases of sickness from communicable diseases prevented, and lives saved by isolation and disinfection.

In the report of this Board for the year 1896 (pp. 153-174) in the introduction to the articles on the dangerous communicable diseases, are printed tables and diagrams which show the results of restrictive measures recommended by this Board.

106 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 1.—*Number of all places* in Michigan at which communicable diseases were reported present, also the number of new places† at which each disease was reported present each week in 1901.*

Weeks ending Saturday—	Consumption.		Diphtheria.		Typhoid fever.		Scarlet fever.		Measles.		Whooping-cough.		Menin- gitis.		Small- pox.	
	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.	All places.	New places.
January.....	5..	159	6	27	10	106	19	95	23	13	6	7	1	2	0	38
	12..	167	6	25	10	95	15	111	28	13	6	8	1	3	1	41
	19..	175	12	34	9	89	19	104	29	16	6	9	1	4	2	25
	26..	174	7	40	18	77	16	98	20	25	5	7	5	3	1	24
February.....	2..	174	8	32	7	65	14	101	19	22	5	8	3	2	0	29
	9..	163	6	30	14	66	15	103	21	22	4	12	3	3	2	25
	16..	162	11	18	5	54	12	101	32	16	1	13	2	3	2	45
	23..	169	12	25	8	45	5	109	12	22	7	10	1	2	1	54
March.....	2..	175	11	33	9	45	7	115	25	17	7	11	4	3	2	54
	9..	176	7	33	9	45	10	110	20	29	3	12	2	2	1	72
	16..	172	6	27	15	40	6	103	21	28	16	13	6	4	0	75
	23..	182	16	26	12	41	16	96	18	25	5	10	4	4	1	77
April.....	30..	183	11	21	7	38	13	82	16	26	9	10	2	5	3	83
	6..	190	6	21	11	40	10	81	22	29	8	13	6	2	2	100
	13..	190	9	23	6	36	14	78	19	21	8	10	6	5	1	104
	20..	194	10	26	17	35	4	90	26	28	9	11	2	4	3	94
May.....	27..	202	15	23	11	30	11	81	27	35	10	13	6	6	5	109
	4..	204	12	13	8	30	14	75	14	29	12	14	1	4	4	109
	11..	199	5	25	3	27	7	70	18	35	7	18	1	7	2	103
	18..	207	22	34	11	31	10	66	14	35	9	19	3	4	4	85
June.....	25..	197	18	27	15	31	6	70	25	34	11	19	6	4	4	76
	1..	200	2	31	7	28	12	69	16	36	9	20	4	2	1	70
	8..	200	9	31	16	24	11	73	23	38	5	17	8	2	0	75
	15..	203	7	25	6	24	9	69	14	35	8	12	5	3	0	82
July.....	22..	200	8	21	7	25	8	57	12	37	11	16	2	3	2	87
	29..	186	10	16	6	27	8	51	11	35	12	16	4	3	0	75
	6..	174	8	20	4	28	9	48	5	30	6	17	3	3	2	65
	13..	175	10	24	7	38	10	51	19	30	6	13	5	5	3	57
August.....	20..	167	3	20	8	36	11	54	13	31	6	7	0	6	1	63
	27..	184	11	23	12	44	13	61	4	21	9	12	4	5	0	68
	3..	190	5	21	3	60	15	50	17	16	6	13	2	4	0	78
	10..	195	11	23	7	69	22	45	6	16	6	14	5	6	2	64
September.....	17..	195	9	17	6	79	20	46	8	14	4	13	5	7	4	42
	24..	193	3	20	5	99	32	52	14	9	1	9	2	3	5	38
	31..	192	7	18	8	100	28	56	16	12	0	11	2	2	1	39
	7..	183	8	25	11	106	34	65	16	11	4	7	2	3	2	26
October.....	14..	167	6	32	7	114	29	61	12	8	3	8	0	2	2	21
	21..	169	6	34	16	113	24	68	21	11	2	14	4	3	5	24
	28..	172	8	32	7	125	28	79	14	13	4	14	5	2	1	29
	5..	176	5	26	8	119	27	76	26	9	1	16	3	1	0	20
November.....	12..	178	7	40	20	116	28	79	15	16	2	17	2	1	2	24
	19..	178	5	42	11	113	14	88	19	12	4	21	5	2	0	29
	26..	182	12	43	9	115	29	89	24	13	4	20	4	2	0	30
	3..	186	6	36	11	120	37	89	25	11	3	14	3	3	2	33
December.....	9..	187	5	51	10	109	22	94	24	14	3	15	2	1	1	38
	16..	186	3	50	15	103	19	84	19	18	8	22	3	0	1	58
	23..	189	7	44	9	90	22	100	24	12	4	20	6	1	0	70
	30..	189	4	43	10	72	13	94	30	12	2	20	3	1	2	73
Av. number of places per week.	7..	191	4	46	15	79	15	101	25	14	1	19	5	1	0	84
	14..	194	10	43	12	68	11	116	22	20	4	19	2	5	1	72
	21..	197	8	39	13	59	14	97	20	22	4	15	1	3	5	72
	28..	196	8	30	10	44	8	98	19	24	7	20	3	3	1	93

* The numbers of "All places" are copied from the weekly bulletins, "Health in Michigan," issued every Wednesday, and include all places at which the several diseases were reported present up to and including Saturday of the calendar week for which each bulletin is issued. The "New places" are included in these numbers.

The remainder of foot-notes are on page 107.

The information contained in the reports upon the above-mentioned blanks and those supplied to health officers of townships, cities and villages, for their annual reports, when returned to this office by the health officers of localities where dangerous communicable diseases have existed, together with other correspondence in regard to outbreaks of such diseases, are the bases on which the various statements made in this article are founded.

It is probable that in previous years, up to the year 1900, every case of smallpox was reported to the Secretary of the State Board of Health; but that cannot yet be said of any other of the diseases in Table 1, and during the present epidemic of a mild form of smallpox, probably it cannot be truthfully said of smallpox. Named in the order of most complete reports, probably these communicable diseases would be arranged as follows: Smallpox, scarlet fever, diphtheria, typhoid fever, measles, whooping-cough, meningitis, consumption.

Some of the purposes of this compilation.—The object in having the data contained in the various reports received at the office of the secretary compiled, tabulated and published are: First, that facts relative to the ways whereby dangerous communicable diseases are spread in Michigan, and how they are sometimes restricted, and other useful facts, may be submitted to the people of the State, knowledge of which, it is hoped, will enable them to avoid or combat such diseases; and second, by the collation of such data to aid in the progress of sanitary science, especially in so far as it bears on the study of the causes and best measures for the prevention of dangerous communicable diseases in Michigan.

Persistent efforts of this Board have been directed toward impressing the people of the State with the necessity of adopting restrictive measures,—isolation and disinfection, in outbreaks of communicable diseases.

Definition of the term "outbreak" as used in this article.—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction), died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area.

The numbers in the first column, "Places," are compiled from the data in card-reports for the sickness statistics, the outbreak reports of communicable diseases, and the weekly reports of communicable diseases.

† The "New places," are those from which the specified diseases were first reported during the calendar week specified in each bulletin. They are compiled from the same sources as are the numbers in the first column of this table and from newspaper reports. Neither of the columns of this table contains all the places at which, later, by the "final" and "annual" reports, the diseases were found to have been present; but the compilation of a table which should contain all such places would be impracticable; and this table is sufficiently complete to give a good practical knowledge of the subject.

108 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

ABSTRACTS FROM THE QUARTERLY REPORTS OF WORK IN THE OFFICE OF THE SECRETARY, DURING THE YEAR 1901.

Summary relative to the year 1901.—The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the year 1901, are as follows: For consumption, 1,582; for diphtheria (including croup) 612; for typhoid and typho-malarial fever 1,019; for scarlet fever 1,035; for measles 330; for whooping-cough 223; for meningitis 440, and for smallpox 583. Total for the eight diseases 5,824.

The number of communications relative to dangerous communicable diseases, received and placed on file during the year, was 25,424.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards or in the form of the circular letter, were sent out during the year, to the number of 22,347.

TABLE 2.—YEAR 1901.—*Exhibiting the number of outbreaks of consumption, diphtheria, typhoid fever, scarlet fever, measles, whooping-cough, meningitis and smallpox, from January 1 to December 31, 1901, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, January 1 to December 31, 1901.	Percent of all reports which were obtained from the newspapers.	Percent of newspaper reports which were confirmed by the health officer.	Percent of newspaper reports which were denied by the health officer.	Percent of newspaper reports to which the health officer made no reply to notice sent from this office.
Consumption.....	*1,582	5	51	15	34
Diphtheria (includes croup).....	*612	2	8	77	15
Typhoid fever (includes typho-malarial) ..	*1,019	10	34	33	33
Scarlet fever.....	*1,035	3	52	21	27
Measles.....	*330	8	50	12	38
Whooping-cough.....	*223	13	28	31	41
Meningitis.....	*440	3	54	15	31
Smallpox.....	*583	3	67	17	16
Averages for the eight diseases.....		5	43	25	32

* The numbers of outbreaks given in this table do not necessarily agree with the numbers given in tables in special articles in this annual report, for the reason that all alleged outbreaks, of which information was obtained from the newspapers and other sources are included in this table. If the health officers denied that such outbreaks occurred, or if they make no response to the letters sent from this office, relative to newspaper reports, such alleged outbreaks are not included in the final compilation of that disease.

The final reports of outbreaks received and filed during the year 1901, were: For consumption 1,508; for diphtheria 497; for typhoid and typho-malarial fever 887; for scarlet fever 935; for measles 237; for whooping-cough 118; for meningitis 287, and for smallpox 451. Total for the eight diseases 4,920.

The registration and return of deaths in Michigan, to the State Department, has resulted in giving this office, during the year 1901, the first information of the occurrence of 1,141 deaths from consumption; 98 deaths from diphtheria and croup; 193 deaths from typhoid and typho-malarial fever; 39 deaths from-scarlet fever; 12 deaths from measles; 48 deaths from whooping-cough, and 352 deaths from meningitis. A total for the seven diseases of 1,883.

During the year 1901, the local columns of 12,379 newspapers have been looked over for the reports of the occurrence of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 82 cases of consumption; 13 outbreaks of diphtheria; 106 outbreaks of typhoid and typho-malarial fever; 29 outbreaks of scarlet fever; 26 outbreaks of measles; 29 outbreaks of whooping-cough; 13 cases of meningitis and 18 outbreaks of smallpox. A total for the 8 diseases of 316. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table (2) on the preceding page.

For the purpose of facilitating the proper action for the restriction of "diseases dangerous to the public health" and to make it possible to compile the important "contagious disease statistics," a record is kept of facts concerning every outbreak of a "disease dangerous to the public health," upon which action is taken by this office, and also of every important communication relating thereto received or sent out. This required nearly 48,000 entries to be made in the "Record Books," one of which books is kept for each dangerous communicable disease. A decrease of 221 entries over the preceding year.

During the year 1901, compared with the year 1900, action was taken on outbreaks of dangerous communicable diseases as follows: On consumption 8 cases less; on diphtheria 147 outbreaks more; on typhoid and typho-malarial fever 159 outbreaks less; on scarlet fever 182 outbreaks more; on measles 559 outbreaks less; on whooping-cough 78 outbreaks less; on meningitis 72 cases less, and on smallpox 478 outbreaks more, than in 1900. Including all diseases, action was taken upon 69 instances less in 1901 than in 1900.

CONSUMPTION IN MICHIGAN—YEAR ENDING DECEMBER 31, 1901.

During the year ending December 31, 1901, there were reported to the Secretary of the State Board of Health 2,915 cases, including 2,344 deaths, from consumption in Michigan.* These reports were received from 891 localities in the State. These numbers are probably less than the actual number of consumption-infected localities in Michigan, and very much less than the actual number of cases. Many cases are of long duration, and in the early stages and sometimes in the latest stages are not under the care of a physician; as a consequence many of these cases are not reported. From many localities the deaths only from consumption are reported; therefore the apparent ratio of deaths to cases is much too high.

CONSUMPTION IN 1901, COMPARED WITH PREVIOUS YEARS.

According to the reports made to the Secretary of the State Board of Health.—The compilation of information relative to the prevalence of consumption in Michigan, as thus reported, was made for the first time for the year 1893. Table 1 shows the reported numbers of cases and deaths from consumption, the number of localities where the disease was reported present, the average numbers of cases and deaths per locality, and the deaths per 100 cases, for each of the years 1893-1901.

TABLE 1.—CONSUMPTION IN MICHIGAN.—*Numbers of reported cases and deaths, number of localities in which they occurred, average number of cases and deaths per locality, and the per cent of cases reported which proved fatal, for each of the 9 years, 1893-1901.*

Year.	Reported localities.	Reported cases.	Average cases per locality.	Reported deaths.	Average deaths per locality.	Deaths per 100 cases reported.†
1893.....	525	1,988	3.8	1,509	2.9	75.9
1894.....	590	2,060	3.5	1,581	2.7	76.7
1895.....	626	2,068	3.3	1,613	2.6	78.0
1896.....	512	2,198	4.3	1,454	2.8	66.2
1897.....	664	1,715	2.6	1,396	2.1	81.4
1898.....	922	3,041	3.3	2,727	3.0	89.7
1899.....	920	2,975	3.2	2,516	2.7	84.6
1900.....	837	2,721	3.3	2,221	2.7	81.6
1901.....	891	2,915	3.3	2,344	2.6	80.4

*On a subsequent page, the number of deaths from consumption reported to the Secretary of State is stated to be 2,088. That number includes only deaths from consumption of the lungs, while the number reported to this office (2,344) is not quite so restricted.

†From many localities the deaths only from consumption are reported; therefore the apparent ratio of deaths to cases is much too high to correctly represent the fatality of the disease; but as time goes on useful information may be gained by a study of the changes likely to occur in this column.

The reports to the Secretary of the State Board of Health, while useful for many purposes, are probably now also useful for comparing the deaths in one year with the deaths in another very recent year.

According to the reports made to the Secretary of State.—Previous to the year 1898, not all deaths were reported to the Secretary of State, but probably the omissions were about the same in every year until the new law for the registration of deaths took effect, in the latter part of 1897; therefore the statistics of the State Department are useful for comparing one year with another, up to the close of the year 1897, also for comparing the several years since that year. But if the deaths since 1897 are to be compared with those previous to 1898 allowance should be made for the fact that a much greater proportion of the deaths which occurred have been reported under the new law than under the old law.

The following table (2) stating the number of deaths from consumption per 100,000 persons living, reported to the Secretary of State, for each of the thirty-three years, 1869-1901, probably quite accurately represents the annual fluctuations of, but not the total deaths from consumption in Michigan during the twenty-nine years, 1869-97. But for the four years 1898-1901 inclusive, the deaths were reported under a new law whereby it is believed that nearly all deaths were reported, whereas previous to that year some of the deaths were not reported.

TABLE 2.—*Exhibiting the number of reported deaths from consumption per 100,000 persons living in Michigan in each of the 33 years, 1869-1901. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population for intercensal years estimated by average annual increase based on National and State censuses.)*

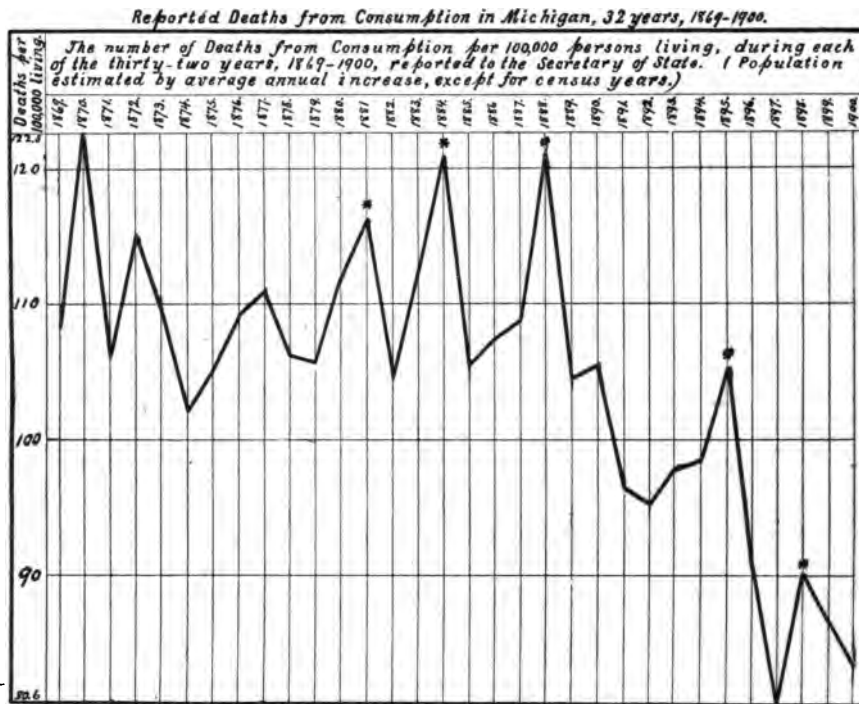
Year.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	
Deaths.....	108.1	122.5	106.0	115.1	109.6	102.0	104.9	109.2	110.9	106.1	105.6	111.7	116.1	104.4	112.3	120.8	
Year.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Deaths.....	105.3	107.3	108.7	121.0	104.3	105.4	96.3	95.2	97.7	98.4	105.1	90.4	80.6	90.1	86.5	83.4	85.1

Reports to the Secretary of State made under the new law, and the deaths therein reported, classified by the Bertillon system, show that in 1898 there occurred in Michigan 2,153 deaths from consumption—tuberculosis of lungs—a death-rate from that disease of 91.5 per 100,000 of the total population; in 1899 there occurred in Michigan, from the same disease, 2,098 deaths, showing a death-rate of 86.5 per 100,000 of the total population; in 1900 there occurred in Michigan from the same disease 2,018 deaths, showing a death-rate of 83.4 per 100,000 inhabitants, a decrease of 3.1 per 100,000 in 1900, as compared with 1899; and in 1901 there occurred in Michigan from the same disease 2,088 deaths, showing a death-rate of 85.1 per 100,000 inhabitants, an increase of 1.7 per 100,000 in 1901, as compared with 1900.

By Table 2, and more readily by the diagram [Plate 1105], it may be seen that there was a remarkable and unprecedented decrease in the death-rate from consumption in Michigan in 1891, compared with any previous year; it was the first time that the disease had ever decreased so much, and the decrease occurred at a time when influenza was epidemic in this country, and the statistics for the Eastern States show an increase

in the death-rate from consumption, which increase was attributed to the influence of the epidemic influenza.

The accompanying diagram [Plate 1105] graphically represents the figures contained in Table 2.



** In 1881, 1887 and 1889, the atmospheric temperature was very low in January, and in February it was slightly lower than the average February during the periods of years, 1864-80, 1884-93, and 1864-97, respectively. In 1895, it was low in January, and very low in February. In 1899, there was no such low temperature in the cold season of the year to which to attribute the apparently unusual mortality from consumption; probably the increase, compared with what might have been expected from the two preceding years, was due to the new law under which a much greater proportion of deaths which occurred were reported than had been in previous years.*

[PLATE 1105]

Relative to the last three years represented in the diagram, nearly all deaths which occurred were reported, while previous to that time the deaths reported should be increased by a very considerable per cent to make them equal the deaths which actually occurred; therefore the reduction in the death-rate from consumption in Michigan has undoubtedly been even greater than is apparent from a first glance at the diagram, Plate 1105.

The decrease in consumption in Michigan has apparently resulted from the education of the people generally to a knowledge that consumption is a dangerous communicable disease, which may easily be restricted. It is one more forcible illustration of the fact that "Knowledge is power." Knowledge of the modes whereby consumption is usually spread, and of the ease with which its spread may be lessened, by the destruction or disinfection of all consumptive sputa, has apparently supplied a "power" which has caused an unprecedented reduction in the death-rate from consumption. The extent of the "campaign of education" which, in Mich-

DISTRIBUTION OF CONSUMPTION IN MICHIGAN IN 1901.

BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS, INCLUDES ALSO ALL SUCH DEATHS REPORTED TO THE STATE DEPARTMENT.



Localities; O. = Outbreaks; C. = Cases per 10,000; population; D. = Deaths per 10,000 population.

114 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 3.—Numbers of cases and deaths reported from consumption and the numbers of reported cases and deaths per 10,000 persons living in each county in Michigan during the year 1901. (Compiled from reports of health officers, etc.)

Counties.	Estimated population for 1901.*	Number of reported		Number per 10,000 population, of		Counties.	Estimated population for 1901.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,450,872	2,915	2,344	11.89	9.56	Keweenaw..	3,285	2	2	6.09	6.09
						Lake.....	4,709	4	4	8.33	8.33
Alcona.....	5,736	8	6	13.95	10.46	Lapeer.....	27,434	31	28	11.30	10.21
Alger.....	6,613	7	6	10.59	9.07	Leelanau....	10,719	6	6	5.60	5.60
Allegan.....	38,748	51	44	13.16	11.35	Lenawee.....	48,382	55	50	11.37	10.33
Alpena.....	18,343	16	16	8.72	8.72	Livingston...	19,534	25	19	12.80	9.73
Antrim.....	17,256	16	10	9.27	5.80	Luce.....	3,088	2	2	6.48	6.48
Arenac.....	10,300	4	3	3.88	2.91	Mackinac....	7,780	11	11	14.14	14.14
Baraga.....	4,335	7	7	16.15	16.15	Macomb.....	33,386	46	37	13.78	11.08
Barry.....	22,315	20	11	8.95	4.93	Manistee....	28,145	24	17	8.53	6.04
Bay.....	62,556	65	62	10.39	9.91	Marquette...	41,776	58	44	13.88	10.53
Benzie.....	9,953	16	15	16.04	15.07	Mason.....	18,961	26	25	13.71	13.18
Berrien.....	49,752	56	50	11.26	10.05	Mecosta.....	20,687	20	15	9.67	7.25
Branch.....	28,077	38	28	13.53	9.97	Menominee...	27,595	17	17	6.16	6.16
Calhoun.....	49,621	51	43	10.28	8.66	Midland.....	14,642	11	11	7.51	7.51
Cass.....	20,826	30	22	14.41	10.56	Missaukee...	9,698	3	3	3.09	1.03
Charlevoix...	14,337	13	12	9.07	8.37	Monroe.....	32,682	32	28	9.79	8.57
Cheboygan...	15,875	14	13	8.82	8.19	Montcalm....	32,519	39	38	11.99	11.69
Chippewa....	22,338	20	19	8.95	8.51	Montmorency	3,366	5	4	14.85	11.88
Clare.....	8,423	8	7	9.50	8.31	Muskegon....	36,988	51	39	13.79	10.54
Clinton.....	24,947	22	19	8.82	7.62	Newaygo.....	17,430	17	16	9.75	9.18
Crawford....	2,981	1	1	3.35	3.35	Oakland.....	45,144	64	42	14.18	9.31
Delta.....	24,649	68	21	27.55	8.52	Oceana.....	15,651	11	10	6.61	6.01
Dickinson...	18,421	24	23	13.03	12.49	Ogemaw.....	8,119	4	4	4.93	4.93
Eaton.....	31,509	30	22	9.52	6.98	Ontonagon...	6,083	21	11	34.52	18.08
Emmet.....	16,854	18	16	10.68	9.49	Osceola.....	18,089	24	16	13.27	8.84
Genesee.....	42,012	60	35	14.28	8.33	Oscoda.....	1,412	0	0	0	0
Gladwin.....	6,840	3	2	4.39	2.92	Otsego.....	6,404	3	3	4.68	4.68
Gogebic.....	17,180	16	14	9.31	8.15	Ottawa.....	39,763	39	32	9.81	8.05
Gd. Traverse.	20,972	44	28	20.98	13.35	Presque Isle.	9,304	6	5	6.45	5.37
Gratiot.....	30,074	32	26	10.64	8.65	Rosecommon..	1,808	3	3	16.59	16.59
Hillsdale...	29,796	30	23	10.07	7.72	Saginaw.....	81,117	99	82	12.20	10.11
Houghton...	69,708	118	74	16.93	10.62	Sanilac.....	35,239	26	21	7.38	5.96
Huron.....	34,479	35	30	10.15	8.70	Schoolcraft..	8,015	6	6	7.49	7.49
Ingham.....	39,839	50	40	12.55	10.04	Shiawassee...	34,034	57	40	16.75	11.75
Ionia.....	24,246	47	37	13.43	10.60	St. Clair.....	55,378	39	35	7.04	6.32
Iosco.....	9,895	8	7	8.08	7.07	St. Joseph...	23,688	37	29	15.62	12.24
Iron.....	9,605	7	5	7.29	5.21	Tuscola.....	36,135	51	50	14.11	13.84
Isabella.....	23,007	25	19	10.87	8.26	Van Buren...	33,641	44	36	13.08	10.70
Jackson.....	48,502	47	41	9.69	8.45	Washtenaw...	48,469	82	44	16.92	9.08
Kalamazoo...	44,685	99	50	22.15	11.19	Wayne.....	358,179	415	403	11.59	11.25
Kalkaska....	7,381	12	10	16.26	13.55	Wexford.....	17,310	25	17	14.44	9.82
Kent.....	131,008	138	124	10.53	9.46						

* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

TABLE 4.—*Exhibiting by months, the number of deaths from consumption, in Michigan for the year 1901, and the averages for the seven years 1894-1900, as reported to the State Board of Health; also exhibiting by months, the number of deaths from pulmonary consumption for the year 1901, and the averages for the seven years 1894-1900, as reported to the Secretary of State.*

Year.	Total number.	Number of deaths for each month.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.....	2,330	255	190	234	231	226	186	180	173	169	177	156	153
Av. 7 years, 1894-1900	1,414	113	118	121	123	133	105	95	105	100	124	131	145
1901*.....	2,088	235	165	217	207	199	169	155	153	142	158	137	151
Av. 7 years, 1894-1900*	2,120	159	165	202	205	205	169	154	174	162	167	174	184

* The last two lines in table 4 are the number of deaths from pulmonary consumption by months as reported to the Secretary of State.

Some of the reasons for believing that the decrease in the death-rate from consumption has been due to the popular education in the way the disease is usually spread, and in the way to restrict the disease, are: 1. The disease was under observation for many years before that knowledge became general, and (as shown by diagram, Plate 1105) it did not decrease; the decrease has been nearly coincident with the education, lagging behind somewhat at the outset, and gradually increasing later, as it would be expected to do if caused by the popular education. 2. Precisely similar decrease occurred in Michigan in the death-rate from scarlet fever and from other diseases, coincident with systematic popular education in the ways those diseases are usually spread, and in the best measures for their restriction. 3. The decrease in the mortality from consumption has, apparently, been greatest in those States where systematic popular education for its restriction has been most general and active. 4. There is no other known cause capable of producing such a gradually increasing effect as is shown to have occurred.

Sickness-rates from reported consumption in 1901.—Table 3 shows the reported sickness and sickness-rates from consumption by counties in the State. For reasons explained in the first paragraph of this article little reliance can be placed on the completeness of the reports of cases on which these particular sickness-rates are based. They are worked out in the hope that in the near future they may be made more valuable. For comparison of sickness from consumption by months, and for the year 1901 with preceding years, reference should be made to the article on "Time of greatest prevalence of each disease," on preceding pages of this volume.

Death-rates from reported consumption in 1901.—Table 3 shows that the death-rate from consumption reported for the whole State in 1901 was 9.56 deaths per 10,000 persons living in the State. Converting this into the form of statement used above with reference to the State Department statistics, it becomes 95.6 deaths per 100,000 persons living; and this differs very much from the rate shown by the State Department. The explanation of this difference is that, whereas the statement by the Department of State includes only deaths from consumption of lungs

(2,088), Table 3 includes all deaths from *consumption* reported to this office (2,344) irrespective of the part of the body in which the disease was located.

The county having the highest death-rate (18.08 deaths per 10,000 of population) was Ontonagon. That having the lowest death-rate (1.03) was Missaukee.

TABLE 5.—*Exhibiting, by sex, in certain age-groups, the number of cases and the number of deaths from consumption; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1901 which stated the ages.*

		Number and per cent of cases and deaths in certain age-groups.																
Ages in groups of years.	Sex.	All known ages *	Under 10 years	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 to 69.	70 to 74.	75 years and over.	
No. of cases.	Males...	1,126	28	19	75	157	155	123	108	118	83	70	51	53	42	21	23	
	Females	1,447	56	35	203	233	216	175	138	85	70	69	62	36	25	23	21	
Per cent the cases in each group were of all cases of known ages.	Males...	-----	2.5	16.9	6.7	13.9	13.8	10.9	9.6	10.5	7.4	6.2	4.5	4.7	3.7	1.9	2.0	
	Females	-----	3.9	2.4	14.0	16.1	14.9	12.1	9.5	5.9	4.8	4.8	4.3	2.5	1.7	1.6	1.5	
No. of deaths.	Males...	978	27	16	70	139	133	107	89	96	70	60	45	47	38	19	22	
	Females	1,259	46	31	181	205	186	158	110	75	60	60	55	35	19	18	20	
Per cent the deaths in each group were of cases in that group...	Males...	86.9	96.4	84.2	93.3	88.5	85.8	87.0	82.4	81.4	84.3	85.7	88.2	88.7	90.5	90.5	95.7	
	Females	87.0	82.1	88.5	89.2	88.0	86.1	90.3	79.0	88.2	85.7	87.0	88.7	97.2	76.0	78.3	95.2	
Per cent the deaths in each group were of all deaths at known ages.	Males...	-----	2.8	1.6	7.1	14.2	13.6	10.9	9.1	9.8	7.2	6.1	4.6	4.8	3.9	1.9	2.2	
	Females	-----	3.7	2.5	14.4	16.3	14.8	12.5	8.7	6.0	4.7	4.8	4.4	2.8	1.5	1.4	1.6	
Per cent the deaths in special groups were of all deaths at known ages.	Males...	-----	4.4			35.0			29.9					30.8				
	Females	-----	6.1			45.4			27.2					21.2				

* Does not include those cases or deaths where the age was not stated.

The first two lines in Table 4 show that in 1901, as compared with the average for the seven years, 1894-1900, there was a large apparent increase in the number of deaths from consumption. This apparent increase may not be real, but due to a larger proportion of the actual deaths being reported since the new registration law became operative, as, in addition to the deaths reported directly to this office, others reported to the Secretary of State, of which we have not been notified by health officers, are received at this office from the bureau of Vital Statistics in the State Department.

The last two lines of Table 4 show the number of deaths from pulmonary consumption by months, as reported to the Secretary of State.

The maximum number of deaths from pulmonary consumption for 1894-1900 occurred in April and May, the minimum number in July.

The maximum number of deaths from all forms of consumption as reported to this office for the years 1894-1900, occurred in December, the minimum number in July.

Source of contagium of consumption.—Of the 2,915 reported cases of consumption during the year 1901, the local health officers reported the source of contagium as follows: Following some previous sickness as, bad cold, la grippe, pneumonia, influenza, etc., 326; hereditary,* 155; previous case, 103; outside jurisdiction, 72; hard work and exposure, 44; infected house, clothing, bedding, etc., 13; dissipation and drunkenness, 9; injury, 9; unsanitary conditions, 7; low condition, 9; following parturition, 9; neglect, 4; army life, 2; gradual, 2; excessive wheeling, 2; idiopathic, 2; heat and smoke in lungs, 1; sick dog, 1; sporadic, 1; killed cow with lump jaw, 1; chronic, 1; sweeping the streets of city, 1; unknown, 425, and not stated, 1,716.

TABLE 6.—AGE DISTRIBUTION OF DECEDENTS FROM CONSUMPTION: *Exhibiting, by sex, the persons who died of consumption, during the year 1901, and also during the years 1894-1900, the number, the average number, and per cent in each period of age. (Compiled from such reports to the State Board of Health, as stated sex and age.)*

Year.	1901.						1894-1900.											
	Number.			Per cent.			Number.			Per cent.			Av. number.					
	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.
Under 10	27	46	73	3	4	3	140	172	312	4	3	4	20	25	45			
10 to 20	86	212	298	9	17	13	330	762	1,092	9	15	12	47	109	150			
20 to 30	272	391	663	28	31	30	1,109	1,621	2,730	29	33	31	158	232	390			
30 to 40	196	268	464	20	21	21	783	1,106	1,889	20	22	21	112	158	270			
40 to 50	166	135	301	17	11	13	566	576	1,142	15	12	13	81	82	163			
50 to 60	105	115	220	11	9	10	433	334	767	11	7	9	62	48	110			
60 to 70	85	54	139	9	4	6	310	296	606	8	6	7	44	42	86			
Over 70	41	39	80	4	3	4	193	154	347	5	3	4	28	22	50			
All ages	978	1,259	2,237	44	56	100	3,864	4,985	8,849	44	56	100	552	712	1,264			

How consumption is most commonly spread.—The tubercle bacillus, the specific cause of consumption, is found in a living state in the sputa from the lungs of persons suffering from that disease. The dust of dried tubercular sputum, when inhaled by susceptible persons, is thought to be the most common way of transmitting pulmonary consumption from person to person. The members of a family or household in which there is a consumptive person may be constantly exposed to the danger of infection, unless the sputa are carefully collected and destroyed. The object of much of the work done by the State Board of Health is to cause

* There is reason to believe that most of the reports which stated the disease to be "hereditary" were made because of the belief of the reporters in the transmission of the disease in that manner, but that most such reports are made without sufficient proof to satisfy any scientific investigator.

the prompt destruction of infected sputa before it is allowed to become dry, and to educate the people in this simple means of restricting the spread of consumption.

The little droplets or moist spray thrown out from the mouth of consumptives in coughing and in forcible speaking has been found to contain the germs of the disease. The ordinary breath of a consumptive does not contain them.

TABLE 7.—*Exhibiting, by sex of patient, the duration in months and years of fatal cases of sickness from consumption, in Michigan, during the year 1901, and the 7 years 1894-1900, arranged in time periods. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of consumption.																				
Year.	Sex.	No. of cases included.	All cases.	Duration of sickness:—Per cent of deaths in each period.																
				1 Month.	2 Months.	3 Months.	4 Months.	5 Months.	6 Months.	7 Months.	8 Months.	9 Months.	10 Months.	11 Months.	Under one year.	1 to 2 yrs.	2 to 3 yrs.	3 to 4 yrs.	4 to 5 yrs.	Five years and over.
1894-1895.	Males	535	100	3.5	5.4	3.7	6.2	4.5	9.7	2.8	3.7	3.9	2.2	1.5	47.2	24.3	14.4	5.8	2.8	6.1
	Females	748	100	2.5	3.7	6.3	7.1	4.7	7.8	4.4	3.5	5.6	2.5	2.7	50.8	24.2	12.6	5.7	1.7	4.1
	Males	2,491	100	5.9	4.5	5.0	5.3	4.9	7.8	4.2	3.7	3.5	3.0	2.6	50.5	24.0	12.0	5.1	2.5	5.1
	Females	3,438	100	3.9	4.6	6.1	5.2	5.1	6.4	4.7	4.4	4.7	2.8	2.9	50.9	24.0	11.3	5.6	2.3	5.1

Ages of greatest prevalence of, and mortality from, consumption.—In Table 5 are shown the numbers of cases and deaths from consumption in Michigan in 1901, in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age-groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent the deaths in each group were of the cases in that group, and the per cent the deaths in principal groups were of all deaths.

TABLE 8.—*Exhibiting, by sex of patient, the duration in months and years, of non-fatal cases (still sick) of consumption, in Michigan, in the year 1901, and for the years 1894-1900, as stated in the reports to the State Board of Health.*

Non-fatal cases of consumption.																					
Year reported	Sex.	No. of cases in- cluded.	Duration of sickness:—Per cent of cases in each period.																		
			All periods.	1 Month.	2 Months.	3 Months.	4 Months.	5 Months.	6 Months.	7 Months.	8 Months.	9 Months.	10 Months.	11 Months.	Under 1 yr.	1 to 2 yrs.	2 to 3 yrs.	3 to 4 yrs.	4 to 5 yrs.	5 to 7 yrs.	Ten years and over.
1901.	Males.....	110	100	3.0	8.2	10.0	22.7	3.6	4.5	4.5	4.5	3.0	5.5	4.5	55.5	23.4	1.0	1.0	1.0	1.0	1.0
	Females...	143	100	2.8	4.2	9.1	4.2	4.9	4.2	2.8	5.6	4.2	8.4	3.5	53.8	14.0	1.0	1.0	1.0	1.0	1.0
1894-1900.	Males	309	100	5.5	3.6	7.1	5.2	4.9	1.9	3.9	6.5	3.2	6.1	3.5	53.8	14.0	1.0	1.0	1.0	1.0	1.0
	Females...	402	100	5.2	6.0	5.5	4.0	3.2	5.5	3.2	5.0	7.2	6.1	3.5	53.8	14.0	1.0	1.0	1.0	1.0	1.0

Table 6 shows, also, that for the year 1901 and for the seven years, 1894-1900, the greatest per cent of deaths was in persons between twenty and thirty years of age, the next greatest per cent between thirty and forty years of age. Also that the per cent of deaths in each age-period is about the same in 1901 as in the seven years preceding.

Cases of consumption reported as having recovered.—In the reports relative to consumption received at this office during the years 1894-1901, one hundred and eight cases were said to have recovered from the disease; eleven of these cases were reported in 1894, six in 1895, seven in 1896, nine in 1897, eight in 1898, eight in 1899, twenty-five in 1900, and thirty-four in 1901; these cases* are tabulated below according to sex, age and duration:—

Males.		Females.			
Age in years.	Duration of sickness by months.	Age in years.	Duration of sickness by months.	Age in years.	Duration of sickness by months.
14	Not stated.	21	44	23	Not stated.
18	7	19	5	Not stated.	13
27	4	35	3	29	10
Not stated.	46	Not stated.	12	31	12
41	Not stated.	37	2	21	9
19	7	20	Not stated.	Not stated.	Not stated.
27	8	22	Not stated.	Not stated.	Not stated.
29	12	16	Not stated.	Not stated.	Not stated.
26	4	36	9	Not stated.	Not stated.
34	Not stated.	Not stated.	Not stated.	23	5
26	Not stated.	35	3		
35	24	20	2		
47	3	42	8		
35	1	30	Not stated.		
42	12	31	13		
Not stated.	Not stated.	24	6		
Not stated.	Not stated.	Not stated.	Not stated.		
24	16	4	14		
35	Not stated.	38	36		
35	23	Not stated.	5		
21	10	6	2		
Not stated.	Not stated.	17	Not stated.		
Not stated.	39	18	7		
5	1	19	Not stated.		
16	12	24	8		
16	3	28	24		
22	1	43	Not stated.		
37	Not stated.	62	17		
40	18	Not stated.	7		
45	4	19	8		
60	8	Not stated.	Not stated.		
64	9	43	12		
Not stated.	Not stated.	Not stated.	Not stated.		
Not stated.	4	Not stated.	12		
Not stated.	Not stated.	16	3		
38	1	Not stated.	5		
Not stated.	2	42	8		
26	5	35	3		
Not stated.	13	20	8		
22	3	33	2		
16	6	33	4		
66	3	28	2		
22	20	17	3		
Not stated.	2	51	Not stated.		
51	22	30	9		
Not stated.	Not stated.	32	6		

* Sex, age and duration not stated in six cases reported as having recovered.

Average age of decedents from consumption.—The average age of decedents from consumption in 1901 was 37 years for males, and 32.3 years for females. The average age of death of males for seven years, 1894-1900, was 36.9 years, and for females, 32.8 years.

Duration of consumption.—Fatal and non-fatal cases.—By Table 7 it may be seen that from reports received for 1901 and for the years 1894-1900, which stated the interval between the time of being taken sick and the time of death from consumption, the largest per cent of both males and females were sick less than one year. The next highest per cent of decedents were sick from one to two years, and as the duration of sickness grew longer the per cent of deaths decreased. The average duration of fatal cases reported in the seven years, 1894-1900, was, for males 20 months and for females 29.2 months.

The average age of cases recovered for the year 1901, was 34.4 years for males and 29 years for females. For the seven years, 1894-1900, the average age was 31.1 years for males and 27.7 years for females.

The average duration of cases recovered for the year 1901, is 7.8 months for males and 6.8 months for females. For the seven years, 1894-1900, the average duration was 10.5 months for males and 12.6 months for females.

Location of the disease, reported for the year 1901, in 1,896 instances.

Lungs	1,505	Kidneys	10	Spleen	2
Lungs and bowels	39	Fibroid	8	Foot	1
Lungs and throat	22	Throat	8	Uterine	1
Lungs and larynx	11	Chest	8	Spine and ankle	1
Lungs and intestines	9	Hip joint	6	Foot and bowels	1
Lungs and bronchi	5	Glands	7	Leg and thigh	1
Lungs, stomach and bowels	5	Bronchi	5	Trachea and stomach	1
Lungs and kidneys	5	Abdomen	5	Head	1
Lungs, liver and bowels	4	Thoracic cavity	5	Heart	1
Lungs and thorax	3	Stomach	5	Bone and bowels	1
Lungs and stomach	3	General	55	Foot and lungs	1
Lungs and peritoneum	3	Bowels	45	Spine and bowels	1
Lungs and chest	3	Bowels and mesentery	1	Acute tuberculosis	2
Lungs and viscera	2	Peritoneum	17	Lymph system	1
Lungs and brains	2	Miliary	19	Breast and bowels	1
Lungs and side	2	Intestines	14	Testicle	1
Lungs and hip	1	Bowels and bronchial tubes	1	Liver	2
Lungs, throat and bowels	1	Stomach and bowels	4	Ovaries and tubes	1
Lungs and windpipe	1	Spine	4	Pelvis	1
Lungs, throat, bowels and head	1	Mesenterica	3	Blood	1
Lungs and pleura	1	Larynx	10	Tongue	1
Lungs, bowels and kidney	1	Pleura	2	Liver and peritoneum	1

Consumptive relatives, reported in 1901 in 488 instances.

Mother.....	50	Wife and daughter.....	3	Stepbrother.....	1
Mother and sister.....	16	Wife and mother.....	1	Brother, sister, son and	
Mother and brother.....	9	Wife, son and daughter...	1	daughter.....	1
Mother, sister and brother	7	Wife, sister and uncle.....	1	Aunts.....	28
Mother and husband.....	2	Wife and niece.....	1	Aunt and uncle.....	8
Mother and aunt.....	1	Husband.....	13	Aunts, uncles and grand-	
Mother, sister, nephew and		Husband and daughter.....	3	parents.....	1
brother.....	1	Husband and children.....	1	Aunt and sister.....	1
Mother, uncle and aunts..	1	Husband and father.....	1	Uncles.....	13
Mother-in-law and brother-		Son.....	10	Uncle and brother.....	3
in-law	1	Son and daughter.....	1	Grandfather.....	3
Father.....	33	Son and grandson.....	1	Grandfather and brother..	1
Father and mother.....	10	Son-in-law	1	Grandfather and aunt.....	1
Father and sister.....	8	Daughter.....	14	Grandmother.....	7
Father, mother and sister	5	Daughter and brother.....	1	Grandmother and mother..	1
Father, mother, brother		Daughter-in-law	1	Grandmother, uncle and	
and sister.....	4	Sisters	79	sister.....	1
Father and brother	3	Sister-in-law	4	Grandparents, uncle and	
Father, brother and sister	2	Sister and stepdaughter..	1	aunt	2
Father and wife.....	2	Sister, grandmother and		Grandparents.....	2
F a t h e r , m o t h e r a n d		aunt.....	1	Cousin.....	10
brother.....	1	Sister and husband.....	1	Cousin and uncle.....	2
Father, mother, sister,		Brother	43	Nephew.....	3
brother and uncle.....	1	Brother and sister.....	17	Niece	1
Father and grandmother..	1	Brother-in-law	3	Family	1
Father, mother, brother,		Brother, sister and grand-		Children.....	4
uncle and cousin.....	1	mother.....	1	Relatives.....	22
Wife.....	8				

By Table 8 it may be seen that, from the reports of non-fatal cases of consumption during the seven years 1894-1900, the highest per cent were sick under one year, the next highest per cent were sick from one to two years, and as the duration grew longer the per cent of cases decreased. The average duration of sickness in non-fatal cases of consumption during the seven years 1894-1900 was, in males 16.4, and in females 18.8 months.

122 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

Occupation of consumptives, reported in 1901 in 1,522 instances.

Housewife.....	537	Miller.....	4	Musician.....	4
Farmer.....	184	Agent.....	3	Milliner.....	3
Laborer.....	177	Fisherman.....	3	Stenographer.....	3
Servant.....	127	Shoemaker.....	3	Superintendent of factory	1
Student.....	95	Butcher.....	3	Factory hand.....	5
Clerk.....	30	Grocer.....	2	Basketmaker.....	1
School teacher.....	18	Lawyer.....	2	Journalist.....	4
Carpenter.....	13	Boilermaker.....	1	Convict.....	6
Dressmaker.....	13	Machinist.....	10	Telegraph operator.....	5
Drayman.....	12	Fireman.....	3	Electrician.....	5
Bookkeeper.....	11	Photographer.....	3	Cigarmaker.....	8
Engineer.....	11	Horseman.....	4	Motorman.....	2
Salesman.....	10	Plumber.....	3	Nun.....	2
Painter.....	10	Miner.....	14	Hostler.....	1
Blacksmith.....	7	Barber.....	7	Dairyman.....	1
Molder.....	7	Live stock dealer.....	1	Priest.....	1
Woodsman.....	6	Mall carrier.....	2	Sawyer.....	2
Mason.....	6	Horologist.....	1	Furniture designer.....	1
Printer.....	5	Cooper.....	2	Actress.....	1
Railroad employé.....	5	Carriage trimmer.....	1	Fruit grower.....	1
Gardener.....	5	Mining engineer.....	1	Wagonmaker.....	1
Nurse.....	5	Merchant.....	8	Furnituremaker.....	4
Cook.....	4	Patients in asylum.....	33	Liveryman.....	1
Physician.....	4	Dancing master.....	1	Sailor.....	4
Baker.....	4	Saloon keeper.....	7	Hotel proprietor.....	2
Tanner.....	1	Metal polisher.....	1	Laundryman.....	1
Soldier.....	1	Druggist.....	1	Organ builder.....	1
Harnessmaker.....	2	Optician.....	1	Advertiser.....	1
Boxmaker.....	1	Wood turner.....	1	Waiter.....	1
Steamfitter.....	1	Milkman.....	1	Press feeder.....	1
Tinsmith.....	2	Bell diver.....	1	Car checker.....	1
Toolmaker.....	1	Foreman.....	1	Pensioner.....	1
Stovemaker.....	1	Patternmaker.....	1		

Consumptive associates.—The question, "Did the patient associate with any consumptive person?" was answered in 1,070 instances, as follows: No, 718; yes, 259; unknown, 93.

The method of disinfection of soiled articles was mentioned in 1,205 instances, as follows:

Burned.....	247	Chloride solution.....	17	Burned, boiled and for-	
Not disinfected.....	184	Destroyed.....	15	maldehyde.....	3
Boiled and burned.....	146	Boiled in zinc water.....	14	Burned, zinc solution and	
Sulphur.....	112	Boiled and formaldehyde.....	13	chloride of lime.....	3
Burning and sulphur fumes	97	Fumigated.....	13	Chloride of lime and burn-	
Boiled.....	59	Sulphur, carbolic and		ing	3
Disinfected.....	53	burned	10	Buried.....	2
Formaldehyde	39	Zinc, sulphur and burning.	10	Scalded.....	1
Unknown	38	Carbolic and sulphur.....	7	Steam and carbolic.....	1
Burning and formaldehyde	30	Zinc solution and fumi-		Burned and buried.....	1
Burned, boiled and fumi-		gated.....	7	Burned, corrosive subl-	
gated.....	25	Sulphur and formaldehyde	6	imate and mercury.....	1
Carbolic solution.....	18	Burned and sterilized.....	6	Steam and carbolic.....	1
Boiling and sulphur fumes.	18	Lime and sulphur.....	5		

Disposal of sputa of patients.—Reports of the local health officers for the year 1901, show that in 570 cases the sputa were burned; in 182 cases the sputa were disinfected before being allowed to dry,—carbolic acid solution and chloride of lime having been generally used; in sixty-eight cases the disinfection or burning was doubtful, or only done for part of the time; in seventy-four cases the health officer reported it was unknown what was done; and in 197 cases the health officer reported positively that the sputa were *not* disinfected or burned, and did not state what was done; in seventeen cases the sputa were buried. In the remaining cases, nothing was reported about the disposal of the sputa.

Bowel discharges were disposed of in 1,116 instances, as follows:

Buried.....	259	On ground.....	36	Washed	2
Unknown	136	Nothing done.....	40	Ashes and buried.....	2
Disinfected	107	Sewer.....	20	Carbolic acid.....	2
Vault.....	100	Disinfected and burned...	14	Destroyed.....	1
Privy.....	97	Chloride of lime.....	8	Creoline.....	1
Disinfected and vault.....	81	Lime and buried.....	6	Carbolic acid and ammonia	1
Closet.....	73	Disinfected and sewer....	4	Carbolic acid and lime....	1
Disinfected and buried....	72	Burned and buried.....	3	Antiseptics	1
Burned	46	Ashes	2	Boiling water.....	1

124 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

For the year 1901 the disease was stated to have begun in 970 instances with—

Cold.....	379	Sore throat.....	2	Following inflammatory	
Influenza or la grippe.....	132	Injury by accident.....	2	rheumatism.....	1
Unknown.....	108	Chills and fever.....	2	Scarlet fever.....	1
Bronchitis.....	93	Abscess of lungs.....	2	Diarrhea and fever.....	1
Hemorrhage.....	64	Pain in lungs.....	4	Typho-malarial fever.....	1
Pneumonia.....	50	Tuberculosis of foot.....	2	Hay fever.....	1
Cough.....	25	Inflammation of bowels...	2	Lung fever.....	1
Gradual.....	24	Asthma.....	2	Cancer.....	1
Catarrh.....	11	Tuberculosis of larynx...	2	Pain in breast.....	1
Pleurisy.....	10	Exposure in war.....	2	Chronic gastritis.....	1
General.....	4	Hoarseness and hemorrh-		Change of life.....	1
Following measles.....	4	age.....	2	Tonsillitis.....	1
Chronic diarrhea.....	4	Tubercular enlargement		Blood poisoning.....	1
Following childbirth.....	4	of spleen.....	1	Gland of neck.....	1
Following typhoid fever..	4	Abscess of spine.....	1	Growth in neck.....	1
Malarial fever.....	3	Tumor.....	1	Potts' disease.....	1
Stomach disease.....	3	Heart trouble.....	1	Hip joint.....	1
Following fever.....	3	Anæmia.....	1		

Nationalities of consumptives, reported in 1,449 instances.

American.....	889	Scotch.....	18	Russian.....	3
German.....	194	Polish.....	13	Bohemian.....	2
Canadian.....	92	Finnish.....	10	Slavonic.....	1
Irish.....	67	Norwegian.....	7	Welsh.....	1
English.....	38	Dane.....	6	Prussian.....	1
Dutch.....	33	Italian.....	3	Mexican.....	1
Swede.....	35	Austrian.....	3	Belgian.....	1
French.....	28	Scandinavian.....	3		

Information contained in final reports of cases of consumption during the year 1901.—One thousand five hundred eighty-eight final reports of cases of consumption in Michigan were received at this office. The information contained in these final reports is summarized below:

Of the 2,624 consumptives of whom the sex was stated, 1,146 were males and 1,478 were females.

Of 1,661 consumptives of whom the color was stated, 1,592 were white, 43 black (negroes) and 26 red (indians).

The complexion of 1,096 consumptives was stated as: Black 7, dark 389, light 700.

The color of hair was stated in 1,093 instances as: Black 46, dark 485, brown 119, auburn 131, light 290, white or gray 22.

Of the civil condition of 1,700 consumptives 993 were reported as married and 707 single.

Of 1,054 replies given in the reports to the question, "Were sputa of consumptives bacteriologically examined?" 645 were "no," 280 "yes," and 129 "unknown."

In answer to the question, "Were persons infected from this patient?" in 255 instances the reply was "yes."

Results of bacteriological examinations of sputa of alleged consumptives in Michigan, in 1901.—The sputa of consumptives was examined in 280 cases, of these 210 (or 75 per cent), gave positive results, that is, the bacilli of tuberculosis were found; 22 cases (or about 8 per cent) gave negative results; and in 42 cases the result was not stated or was unknown.

Infection by direct contact or association.—The health officer of Wakefield village, Gogebic county, reporting relative to a case of consumption, said:—

"Contracted while nursing her friend who had the disease."

Bad ventilation and la grippe.—Relative to decedent from consumption in Iron Mountain city, Dickinson county, the health officer in a final report said:—

"Had la grippe in January, 1901; worked in bad air and dust all his life."

Infected bedding.—Relative to a death from consumption in Ithaca village, Gratiot county, the health officer wrote:—

"She received a present of some bed clothes from a consumptive patient, the case dying of consumption."

Dried sputum.—The health officer of Glen Arbor township, Leelanau county, in his final report wrote:—

"By allowing the sputa to become dry and inhaling the dust."

Sequela of la grippe.—The attending physician in a case in Crockery township, Ottawa county, wrote to this office as follows:—

"In reply to your query I have this to say regarding Mrs. D——, that I never saw Mrs. D—— until August 29, 1901, and then for an attack of hysteria. I made her two calls only, she had a baby about one month old. At the time I found her very much emaciated with a loose cough, which I learned she had had for the past year, a sequela of la grippe. The history and looks of her was such as to make me think she had consumption or in a short time would have. So I told the husband. He in a few days removed her to her mother's in the country, and on September 17, I learned she had suddenly died and had not had a physician. Therefore when the certificate of death was brought me I felt justified in calling the disease consumption."

From injury.—Relative to a death from consumption in St. Clair city, St. Clair county, the health officer stated in his final report that the source of contagium came from "an injury to hip when a child."

In answer to the question were the rooms occupied by consumptive patients disinfected, only 1,130 instances were given for the year 1901 as follows:—

In 296 instances sulphur, three pounds or more per thousand cubic feet, was used; in 361 instances sulphur, the amount not stated or amount not enough; in 163 instances formaldehyde to the amount of eight ounces per thousand cubic feet or over was used, and in 282 instances formaldehyde was used but amount not enough or amount not stated; in 14 instances sulphur and formaldehyde were both used, but amount not stated; in 7 instances the rooms were disinfected; in 3 instances carbolic acid; in 1 instance carbolic acid, chloride of lime and sulphur; in 1 instance bi-chloride and mercury; in 1 instance sulphur, carbolic acid and formaldehyde; and in 1 instance sulphur and saltpetre.

PNEUMONIA IN MICHIGAN IN 1901.

During the year 1901, reports relative to 105 cases, including thirty-two deaths, from pneumonia were received at this office from twenty-four localities in Michigan, as follows:

Dorr township, Allegan county, three cases; Harrisville village, Alcona county, one fatal case; Benton Harbor city, Berrien county, four cases; Albion township, Calhoun county, two cases; Peninsula township, Grand Traverse county, two fatal cases; Oscoda village, Iosco county, one fatal case; Sandstone township, Jackson county, one fatal case; Kalamazoo township, Kalamazoo county, two cases; Kalamazoo city, Kalamazoo county, fifty-nine cases, including thirteen deaths; Portage township, Kalamazoo county, one case; Cedar Springs village, Kent county, six cases, including three deaths; Solon township, Kent county, one case; Ishpeming city, Marquette county, three cases; Marquette city, Marquette county, one case; Michigamme township, Marquette county, three cases, including one death; Frenchtown township, Monroe county, one fatal case; Muskegon city, Muskegon county, one case; Interior township, Ontonagon county, two fatal cases; Holland city, Ottawa county, one case; Rush township, Shiawassee county, five cases, including two deaths; Fairgrove township, Tuscola county, one fatal case; Vassar village, Tuscola county, one fatal case; Waverly township, Van Buren county, one fatal case; Bridgewater township, Washtenaw county, two fatal cases.

The above mentioned are all the cases of pneumonia reported to this office during the year; but they constitute only a very small proportion of the whole amount of sickness from this disease in the State during this period. Reference to Table 1 of the article on "Sickness Statistics" in this report shows that of the 5,850 weekly card reports received at this office during the year, twenty per cent state the presence of pneumonia under the observation of the reporter.* The Vital Statistics Bulletins, published by the State Department, indicate that in the year 1901 pneumonia caused more deaths in Michigan than any other disease. However, deaths from "typhoid pneumonia" have been included with the deaths from pneumonia. The office of the State Board of Health has knowledge of 51 deaths reported from "typhoid pneumonia." If deaths reported from "broncho-pneumonia" were also to be included with pneumonia, the total deaths would, for the year 1901, outnumber those from consumption, from which the deaths have been decreasing in recent years.

In preceding years when the State Department Bulletins have shown more deaths from pneumonia than from consumption, the final compilation has shown a less number from pneumonia, some deaths at first attributed to pneumonia having been found later to have been chargeable to some other disease, the pneumonia having been only the immediate cause, another having been the main disease.

* By the same table it may be seen that twenty-two per cent stated the presence of consumption, under the observation of the physicians reporting; the statements relative to the two diseases indicating that pneumonia caused nine per cent less sickness than did consumption.

DIPHTHERIA IN MICHIGAN.—YEAR ENDING DEC. 31, 1901.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD OF HEALTH.

During the year ending December 31, 1901, there were reported to the Secretary of the State Board of Health, 525 outbreaks of diphtheria in 412 localities in Michigan, which resulted in 2,498 cases, including 493 deaths.

In comparing the deaths from diphtheria reported to the office of the State Board of Health (493) with those reported to the State Department (498), as shown by the bulletin of that Department, it is noticed that the deaths reported to the State Department exceed those reported to the State Board of Health by five. Differences exist in the distribution of deaths by counties. The final compilation of deaths in the State Department for the year 1901 has not been made and the several differences may be accounted for when that occurs, as it is not infrequently the fact that changes in the alleged causes of death are made through correspondence with those physicians who reported two or more causes for one death. In the Bulletin, preference is given, in such instances, to the disease which is communicable and which should, therefore, have action taken for its restriction.

The average number of cases of sickness and deaths per outbreak were, cases 4.76; deaths .94. The fatality, i. e., the per cent of cases which proved fatal, was 19.7.

Antitoxin treatment of diphtheria.—In the reports relating to diphtheria in Michigan during the year 1901, effort has been made to collect information relating to the use of diphtheria antitoxin. From reports made by health officers in different localities, it is evident that beneficial results have been attained through its use. In outbreaks where that agent has been made use of in the early stages of the disease, and properly administered, not only has the number of cases and deaths been diminished, but often a subsequent development of the disease has proved to be of a very mild type, which indicates to some extent the efficiency of antitoxin as an immunizing, as well as a curative agent.

TABLE 1.—*Summary of data relative to the use of diphtheria antitoxin in Michigan in 1900 and 1901.*

	Outbreaks.	Cases.	Deaths.	Fatality-rate.—deaths per 100 cases.
All outbreaks.....	1900—493 1901—525	2,706 2,498	528 493	19.5 19.7
Outbreaks in which antitoxin was used.....	1900—135 1901—184	535 589	81 90	15.4 15.3
Outbreaks in which antitoxin was not used.....	1900—358 1901—341	2,171 1,909	477 403	20.6 21.1

By the above summary it will be noticed that antitoxin was reported used in forty-nine more outbreaks of diphtheria in 1901 than in 1900, and that fifty-four persons were reported treated with antitoxin in 1901, more than in 1900. The deaths per one hundred cases during the two years among persons treated with antitoxin were about the same in each year,—15.1 and 15.3 respectively. In outbreaks where antitoxin was used there were in 1900; 5.5 less deaths, and in 1901, there were 5.8 less deaths per one hundred cases than in those outbreaks where it was not used.

Below are quoted a few extracts from reports of health officers in different localities who have made use of diphtheria antitoxin:

Relative to an outbreak of diphtheria in Munising village, Alger county, in which four persons sick were treated with antitoxin, the health officer, Dr. Frank A. Grawn, wrote as follows:

"Inside of twenty-four hours, swelling of throat subsided and membranes loosened, and the general symptoms materially improved."

During an outbreak of diphtheria in West Bay City, where nineteen persons were treated with antitoxin, Dr. A. F. Hagadorn, the health officer, reported as follows:

"The three cases who died all had antitoxin administered, but all too late to be of any benefit. In every case where administered early, results were perfect."

In Climax township, Kalamazoo county, where one person sick and three persons exposed, were treated with antitoxin, the health officer, Dr. O. F. Seeley, reported as follows:

"I attribute their exemption from the disease to the use of antitoxin."

In Sherman township, Isabella county, there were nine persons in the outbreak who were exposed and treated with antitoxin who did not develop the disease. The health officer, Asa A. Smith, reported as follows:

"Of nine exposed and treated with antitoxin only one took the disease."

Many reports of a similar nature could be here produced from physicians throughout the State commending the antitoxin treatment.

Distribution of diphtheria by counties in 1901.—Table 3 exhibits the reported diphtheria by counties during the year. Said table shows, in addition to the actual numbers of reported cases and deaths, the sickness and death-rates per 10,000 of population in each county; thus rendering the relative amount of sickness and death from this disease in the counties more readily conceivable.

Sickness-rates from diphtheria in 1901.—Table 3 shows the sickness-rate for the whole State during the year was 10.19 per 10,000 of population. By counties, the greatest sickness-rate (83.83) was in Presque Isle county; and the lowest (.31) was in Montcalm county. In ten counties there was no reported sickness from diphtheria.

Death-rates from diphtheria in 1901.—The death-rate for the State was 2.01 per 10,000 of population. The highest death-rate (15.05 per 10,000 of population), was in Presque Isle county; and the lowest where deaths occurred (.40 of one death per 10,000 of population), was in Calhoun county. In seventeen counties there were no reported deaths from diphtheria.

The proportionate case-rate, death-rate and fatality or case mortality, in cities, villages, and townships.—The proportionate fatality, or "case mortality," from diphtheria in 1901, i. e., the proportion of reported cases which proved fatal, was, for the whole State, 19.7 per cent, or nearly one death to about five cases.

From the data in Table 4 it may be observed that 77 per cent of the cities, 23 per cent of the villages, and 23 per cent of the townships in the State were infected with diphtheria, but the average population of the cities is thirteen times the average of the villages. The lowest case-rate (8.98) occurred in the townships, and the lowest death-rate (1.49) occurred in the villages. The highest case-rate (11.73) and death-rate (2.09) occurred in the cities, the case-rate in cities being 1.59 greater and the death-rate .60 greater than in the villages. The highest fatality, 23 per cent, occurred in the townships, and the lowest, 15 per cent, occurred in the villages.

The last line of figures in Table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. There may be a time during the outbreak when no cases are present, but if the subsequent cases can be attributed to infection from preceding ones, it is called one outbreak. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported, and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were forty more beginnings than endings of outbreaks reported during the year 1901.

TABLE 2.—*Exhibiting for the ten years, 1884-1893, the number of reported outbreaks, localities, cases and deaths; average number of cases and deaths per outbreak, and the per cent of cases which proved fatal (fatality rate) for each of the ten years, 1884-1893, before the use of antitoxin. Also a similar average for eight years, 1894-1901, since the use of antitoxin.*

Year.	Reported outbreaks.	Reported localities.	Reported cases.	Average cases per outbreak.	Reported deaths.	Average deaths per outbreak.	Deaths per 100 cases.
1884.....	362	302	3,915	10.8	905	2.5	23.
1885.....	467	396	4,018	8.6	964	2.0	24.
1886.....	550	422	4,244	7.7	982	1.8	23.
1887.....	466	371	3,382	7.3	825	1.8	24.4
1888.....	337	283	2,228	6.6	532	1.6	23.9
1889.....	398	329	3,157	7.9	683	1.7	21.6
1890.....	442	365	4,206	9.5	1,050	2.4	25.
1891.....	535	461	4,385	8.2	1,002	1.9	22.8
1892.....	527	463	4,818	9.1	1,099	2.1	22.8
1893.....	546	460	4,736	8.7	1,092	2.0	23.1
Average for 10 years, 1884-93.....	463	385	3,909	8.4	913	2.0	23.4
1894*.....	435	367	3,852	8.9	744	1.7	*19.3
1895.....	401	347	3,433	8.6	708	1.8	20.6
1896.....	423	331	4,013	9.5	757	1.8	18.9
1897.....	495	396	4,132	8.3	756	1.5	18.3
1898.....	439	354	2,357	5.4	477	1.1	20.2
1899.....	366	303	2,154	5.89	435	1.19	20.2
1900.....	493	399	2,701	5.49	528	1.07	19.5
1901.....	525	412	2,498	4.76	493	.94	19.7
Average for 8 years, 1894-1901.....	447	364	3,143	7.0	612	1.4	19.5
Departure of average for 8 years, 1894-1901, from average for 10 years, 1884-93.	-16	-21	-766	-1.4	-301	-.6	-3.9

* The use of antitoxin for diphtheria was commenced about this time.

130 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 3.—Numbers of cases and deaths reported from diphtheria per 10,000 persons living in each county in Michigan during the year 1901. (Compiled from reports of health officers, clerks, etc.)

Counties.	Population for 1901.	Number of reported		Number per 10,000 population, of		Counties.	Population for 1901.	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,450,872	2,498	493	10.19	2.01	Keweenaw ..	3,285	0	0	0	0
						Lake.....	4,799	0	0	0	0
Alcona.....	5,736	0	0	0	0	Lapeer.....	27,434	106	12	38.64	4.37
Alger.....	6,613	16	0	24.19	0	Leelanau....	10,719	7	1	6.53	.93
Allegan.....	38,748	10	0	2.58	0	Lenawee....	48,382	6	4	1.24	.83
Alpena.....	18,343	9	3	4.91	1.64	Livingston...	19,534	8	2	4.10	1.02
Antrim.....	17,256	7	2	4.06	1.16	Luce.....	3,088	0	0	0	0
Arenac.....	10,300	30	5	29.13	4.85	Mackinac....	7,780	3	1	3.86	1.29
Baraga.....	4,335	6	1	13.84	2.31	Macomb.....	33,386	23	6	6.89	1.83
Barry.....	22,315	3	1	1.34	.45	Manistee....	28,145	18	3	6.40	1.07
Bay.....	62,556	78	16	12.47	2.56	Marquette...	41,776	134	11	32.08	2.63
Benzle.....	9,953	1	0	1.00	0	Mason.....	18,961	4	0	2.11	0
Berrien.....	49,752	18	6	3.62	1.21	Mecosta.....	20,687	17	1	8.21	.48
Branch.....	28,077	8	3	2.85	1.07	Menominee..	27,595	22	8	7.97	2.90
Calhoun.....	49,621	22	2	4.43	.40	Midland.....	14,642	18	5	12.29	3.41
Cass.....	20,826	6	2	2.88	.96	Missaukee....	9,698	19	6	19.59	6.19
Charlevoix...	14,337	18	3	12.55	2.09	Monroe.....	32,682	27	5	8.26	1.53
Cheboygan...	15,875	33	5	20.78	3.15	Montcalm....	32,519	1	0	.31	0
Chippewa....	22,338	20	8	8.95	3.58	Montmorency	3,366	0	0	0	0
Clare.....	8,423	9	2	10.69	2.37	Muskegon....	36,988	26	4	7.03	1.08
Clinton.....	24,947	20	9	8.02	3.61	Newaygo....	17,430	2	1	1.15	.57
Crawford....	2,981	0	0	0	0	Oakland.....	45,144	25	3	5.54	.66
Delta.....	24,649	17	8	6.90	3.25	Oceana.....	16,651	9	3	5.40	1.80
Dickinson...	18,421	21	3	11.40	1.63	Ogemaw.....	8,119	7	2	8.62	2.46
Eaton.....	31,509	25	7	7.93	2.22	Ontonagon...	6,083	12	2	19.73	3.29
Emmet.....	16,854	12	3	7.12	1.78	Osceola.....	18,189	3	1	1.66	.55
Genesee.....	42,012	30	5	7.14	1.19	Oscoda.....	1,412	0	0	0	0
Gladwin.....	6,840	0	0	0	0	Otsego.....	6,404	9	1	14.05	1.56
Gogebie.....	17,180	57	8	33.18	4.66	Ottawa.....	39,763	33	9	8.30	2.26
Gd. Traverse.	20,972	13	5	6.20	2.38	Presque Isle.	9,304	78	14	83.83	15.05
Gratiot.....	30,074	8	2	2.66	.67	Roscommon..	1,808	0	0	0	0
Hillsdale....	29,796	0	0	0	0	Saginaw.....	81,117	196	38	24.16	4.68
Houghton....	69,708	38	13	5.45	1.86	Sanilac.....	35,239	75	7	21.28	1.99
Huron.....	34,479	10	4	2.90	1.16	Schoolcraft..	8,015	21	8	26.22	9.98
Ingham.....	39,839	58	9	14.56	2.26	Shiawassee..	34,034	45	8	13.22	2.35
Ionia.....	34,246	38	12	11.10	3.50	St. Clair.....	55,378	41	10	7.40	1.81
Iosco.....	9,895	60	14	60.64	14.15	St. Joseph...	23,688	2	0	.84	0
Iron.....	9,605	49	12	51.02	12.49	Tuscola.....	36,135	22	8	6.09	2.21
Isabella.....	23,007	26	4	11.30	1.74	Van Buren...	33,641	17	6	5.05	1.78
Jackson.....	48,502	5	0	1.03	0	Washtenaw..	48,469	73	11	15.06	2.27
Kalamazoo...	44,685	21	3	4.70	.67	Wayne.....	358,179	377	61	10.52	1.70
Kalkaska....	7,381	45	9	60.97	12.19	Wexford.....	17,310	29	7	16.75	4.04
Kent.....	131,008	136	35	10.38	2.67						

TABLE 4.—*Exhibiting the numbers of outbreaks and cases of and deaths from diphtheria which occurred in the cities, villages, and townships of Michigan in 1901, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages, and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Classes of political divisions and numbers of each class of divisions.	Popula- tion.	Health jurisdictions.	Outbreaks in—			Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Rates per 10,000 population.				
			Localities.		No. of				Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Cases.	Deaths.
			No. of	Per cent of all local- ities.									
State (83 counties).....	2,450,872	1,595	412	26	525	2,498	493	20	10.19	2.01			
Cities.....	959,711	79	61	77	94	1,126	201	18	11.73	2.09			
Villages.....	282,146	310	70	23	82	256	42	15	10.14	1.49			
Townships.....	1,209,015	1,206	281	23	349	1,086	250	23	8.98	2.07			

TABLE 5.—*Exhibiting the number of outbreaks of diphtheria which were reported to have begun, to have ended, and the number which were present, in each month of the year 1900, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Outbreaks began..	83	40	33	30	48	22	27	30	49	56	49	42	509
Outbreaks ended..	37	40	40	42	28	33	30	24	28	30	53	84	469
Outbreaks present.	91	94	83	72	78	71	65	65	90	108	127	118	.....

TABLE 6.—*Exhibiting the number and per cent of localities from which the presence of diphtheria was reported, and the number and per cent of cases of diphtheria present in Michigan in each month during the year 1901. (Includes each case for which, the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Localities, number.....	90	93	82	72	78	71	65	65	89	107	127	117
Per cent.....	21.8	22.6	19.9	17.5	18.9	17.2	15.8	15.8	21.6	26.0	30.8	28.4
Cases present, number....	260	230	187	160	207	154	142	154	235	393	375	347
Per cent.....	10.4	9.2	7.5	6.4	8.3	6.2	5.7	6.2	9.4	15.7	15.0	13.9
Cases taken sick, number.	254	167	155	133	178	94	104	128	178	346	274	243
Per cent.....	10.2	6.7	6.2	5.3	7.1	3.8	4.2	5.1	7.1	13.9	11.0	9.7

The first line in Table 6, shows, for 1901, the number of localities in Michigan at which diphtheria was present in each month of the year. The second line shows the per cent those localities were of the total number of localities for the year.

The third line gives the number of cases sick in each month of the year, and the fourth line gives the per cent the cases present by months were of all cases reported.

The fifth line of the table gives the number of cases taken sick each month, and the last line shows the per cent the cases taken sick in each month were of the total reported cases.

Table 6 shows the influence of seasonal changes upon the prevalence of the disease. While present in the State during the entire year, a marked increase in the number of reported cases of diphtheria is noticeable during the month of September, this increase continuing through October, November and December. In January a gradual decline begins which continues until a minimum is reached in June and July, thus indicating that meteorologic and seasonal changes have an appreciable influence over the prevalence of the disease. The greatest prevalence of the disease is in October soon after the opening of the public schools, which usually occurs early in September. But the increase of the disease begins before the schools open, showing that the influence of the low temperature in increasing the disease is very great.

Source of contagium of diphtheria, and how the disease is spread.—Of the 2,498 cases of diphtheria reported during the year 1901, the local health officers reported the source of contagium as follows: Traced to a former case, 493; traced to cases of croup, membranous croup and diphtheritic croup, 82; attributed to unsanitary conditions, 34; contagium reported as from outside jurisdiction, 223; unknown, or reports not definite (includes those reported "contagium," "sporadic," "spontaneous," etc.), 936; source not stated, 730; total, 2,498.

Cases of diphtheria traced to preceding cases of the disease.—As shown above, 493 of the 2,498 reported cases of diphtheria in Michigan in 1901, were traced to preceding cases of the disease. Had all first cases in the various jurisdictions been properly isolated, no doubt a large part of these 493 cases would have been prevented.

In 1901, as in previous years, the source of contagium of a number of cases was attributed to "unsanitary conditions." While such conditions may favor the spread of the disease and cause it to assume increased malignancy, the "germ" or contagious principle of the disease, must be present or the disease will not exist.

The contagium of diphtheria was reported by local officers to have spread from thirty-eight first localities to other (second) localities, resulting in forty-two outbreaks, with an aggregate of one hundred and thirty-four cases, including eighteen deaths; and from three of these second localities to other (third) localities resulting in five outbreaks with fourteen cases, including two deaths. Eleven outbreaks with an aggregate of forty-one cases, including five deaths, were traced to localities outside of Michigan. The source of contagium of eighteen outbreaks, with an aggregate of fifty-seven cases, including eight deaths, was reported as probably traced to outbreaks in other jurisdictions in Michigan; and two outbreaks with four cases, including one death, as probably traced to outbreaks in localities outside the State.

Estimated number of cases of diphtheria prevented and lives saved by isolation and disinfection.—Tables 7 and 8 and diagram [Plate No. 1139] compare the average numbers of cases and deaths in outbreaks of diphtheria where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.* By Table 7 it may be seen that during the fifteen years, 1887-1901, there were nearly five times as many cases and deaths per outbreak in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By Tables 7 and 8 it may be seen that during the year 1901 there were reported to the office of the State Board of Health 502 outbreaks of diphtheria, with 2,020 cases, including 391 deaths. Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and disinfection both neglected," there would have occurred 4,458 cases, including 753 deaths, and taking from these respectively the cases (2,020), including deaths (391) which did occur, leaves 2,438 cases, including 362 deaths, indicated as prevented in these 502 outbreaks by isolation and disinfection. By the same method of computation for each year the indicated saving during the fifteen years, 1887-1901, is 39,320 cases, including 7,880 lives.

Definition of outbreak.—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the later cases are considered as part of the same outbreak. Possibly the sixty-day limit may at some future time be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of years require that outbreaks be counted as closed, at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

Tables seven and eight show in 1901, as compared with 1900, an increase in the number of outbreaks, in the cases per outbreak, and in the deaths per outbreak; and a comparison of 1901 with the average for the preceding fifteen years, shows an increase in the number of outbreaks, and a decrease in the numbers of cases and deaths per outbreak.

* In the compilation of the reports for Tables 7 and 8 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate and disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and disinfection enforced." If, however, he neglects to properly isolate and disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

TABLE 7.—DIPHTHERIA IN MICHIGAN, 1887-1901.—Exhibiting for the 15 years, 1887-1901, the numbers of reported outbreaks, cases and deaths; also for this 15 year period, the average number of cases and deaths per outbreak in all outbreaks; in those outbreaks in which isolation or disinfection was neglected; in which both isolation and disinfection were neglected; in which both isolation and disinfection were enforced; and also the numbers of cases and deaths indicated to have been prevented by isolation and disinfection.

Years.	All outbreaks.*			Isolation and disinfection, or both, not mentioned, or statements doubtful.			Isolation and disinfection both neglected.			Isolation and disinfection both enforced.			Indicated saving of cases and lives by isolation and disinfection.		
	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.
1887.....	308	2,321	551	202	732	190	60	822	195	78	198	51	43	132	4733
1888.....	311	1,520	324	199	810	180	34	527	81	58	101	31	8	252	418
1889.....	376	1,946	418	254	1,314	280	41	478	108	63	98	14	2	398	570
1890.....	439	2,713	619	291	1,449	401	71	942	169	46	70	15	2	862	426
1891.....	532	2,945	643	366	1,777	389	79	904	164	70	157	33	3	392	666
1892.....	535	3,465	740	323	2,341	456	52	657	147	49	105	24	3	146	746
1893.....	538	3,133	746	303	1,681	392	74	1,020	282	65	159	45	4	253	1,260
1894.....	430	2,292	404	208	1,066	174	56	510	119	81	176	37	3	274	512
1895.....	388	2,302	425	178	1,102	209	45	610	119	70	146	28	2	969	599
1896.....	405	2,460	432	153	925	165	64	794	142	69	164	27	2	568	467
1897.....	464	2,838	497	166	916	137	100	1,366	252	93	225	46	3	500	672
1898.....	399	1,535	308	127	516	114	79	539	103	77	149	28	1	186	211
1899.....	348	1,116	248	106	391	92	68	372	73	91	213	34	1	276	124
1900.....	460	1,568	343	146	571	150	92	446	85	99	169	30	6	395	80
1901.....	502	2,020	391	165	599	138	88	781	132	127	254	49	2	438	362
Totals for the 15 years, 1887-1901.....	6,503	34,250	7,099	3,182	16,310	3,446	1,003	10,896	2,204	4,136	2,384	492	439	2,320	17,880
Average for the 15 years, 1887-1901.....	434	2,283	473	212	1,087	230	67	726	147	76	159	33	2	621	535
Average cases and deaths per outbreak for the 15 years, 1887-1901.....	.....	5.26	1.09	.....	5.13	1.08	.....	10.84	2.19	.....	2.09	.43	.....	.....	.....

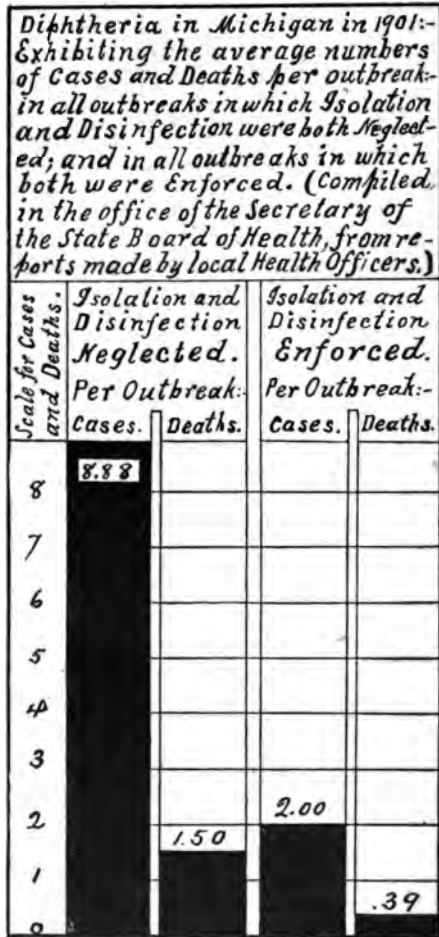
* These do not include the cases and deaths in a number of the larger cities (foot-note to Table 8), because of the difficulty in determining the beginning and ending of an outbreak in those cities in which the disease was present in some part of the city nearly all the year. † The numbers of cases and deaths in this double column are found by multiplying "All outbreaks" for each year by the average number of cases, or deaths per outbreak in those outbreaks in which "isolation and disinfection both were neglected," for that year, and deducting from the result thus obtained, the cases or deaths, as the case may be, which were reported to have occurred that year. ‡ The two sets of numbers appearing in this column are based on two distinct methods of solution which are explained as follows: (1) the 39,320 cases and 7,890 deaths are totals of the columns representing cases and deaths saved as explained in the † foot-note; (2) the 36,243 cases and 7,149 deaths are obtained by multiplying the average numbers of cases and deaths per outbreak for the fourteen years, 1887-1901 (10.84 and 2.19 where isolation and disinfection were neglected), by the total number of outbreaks to find the numbers which would have occurred if all outbreaks had been neglected and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the fourteen-year period.

TABLE 8.—DIPHTHERIA IN MICHIGAN IN 1901.—Exhibiting the average numbers of cases and deaths per outbreak—(1) in all the 502 outbreaks reported; (2) in the 165 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 17 outbreaks in which disinfection was enforced and isolation doubtful; (4) in the 32 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 20 outbreaks in which disinfection was enforced and isolation neglected; (6) in the 30 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 88 outbreaks in which isolation and disinfection were both neglected; (8) in the 127 outbreaks in which isolation and disinfection were both enforced.

	(1) All outbreaks. (502 outbreaks.)*		(2) Isolation or disinfection or both not mentioned, or statements doubtful. (165 outbreaks.)		(3) Disinfection enforced— isolation doubtful. (17 outbreaks.)		(4) Isolation enforced— disinfection doubtful. (32 outbreaks.)		(5) Disinfection enforced— isolation neglected. (20 outbreaks.)		(6) Isolation enforced— disinfection neglected. (30 outbreaks.)		(7) Isolation and disinfection both neglected. (88 outbreaks.)		(8) Isolation and disinfection both enforced. (127 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals....	2,020	391	599	138	85	8	66	14	228	40	57	10	781	132	254	49
Averages	4.02	.78	3.63	.84	2.06	.47	2.06	.44	4.30	.76	2.85	.50	18.88	1.50	12.00	1.39

* These do not include the cases and deaths in Detroit, Grand Rapids, Kalamazoo, Alpena, Battle Creek, Saginaw, Bessemer, Lansing and Owosso, because of the difficulty in determining the beginning and ending of an outbreak in these localities, in which the disease was present in some part of the locality nearly all the year. † These figures are graphically represented in the diagram, Plate 1139, on this page.

ISOLATION AND DISINFECTION RESTRICT DIPHTHERIA.



[PLATE 1139]

136 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 9.—*Exhibiting the reported period of incubation, stated in days, in 102 cases of diphtheria. Compiled from reports of health officers in Michigan, for the year 1901.*

Incubation period—days.....	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	21	22	40
Cases in each period.....	2	10	*8	†7	‡7	§20	¶6	¶6	**12	1	††5	2	††8	1	§§1	2	1	1	1	1

* In 1 case about 4 days.

† In 3 of these cases about 5 days.

‡ In 2 of these cases about 6 days.

§ In 3 of these cases about 7 days.

¶ In 2 of these cases about 8 days.

|| In 1 case about 9 days.

** In 5 of these cases about 10 days.

†† In 1 case about 12 days.

†† In 2 of these cases about 14 days.

§§ In 1 case about 16 days.

The average period of incubation of diphtheria in the 102 cases is 8.7 days.

TABLE 10.—*Exhibiting in certain age-groups, the numbers of cases and deaths from diphtheria, the per cent that the cases in each group were of all cases of known ages; the per cent that the deaths in each group were of all deaths at known ages; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1901, which stated the ages.*

Ages in groups of years	Number and per cent of cases and deaths in certain age-groups.																
	All known ages.	0-1.	1-2.	2-3.	3-4.	4-5.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50 and over.
No. of cases*.....	1,988	33	66	115	160	142	516	625	370	175	102	66	59	33	18	13	11
Per cent the cases in each group were of all cases of known ages.....	100	1.7	3.3	5.8	8.0	7.1	26.0	31.4	18.6	8.8	5.1	3.3	3.0	1.7	.9	.7	.6
No. of deaths.....	479	22	36	53	56	46	213	153	61	19	11	8	5	2	2	1	4
Per cent the deaths in each group were of all cases in that group	24.09	66.7	54.5	46.1	35.0	32.4	41.3	24.5	16.5	10.9	10.8	12.1	8.5	6.11	1.1	7.73	6.4
Per cent the deaths in each group were of deaths, known ages..	100	4.6	7.5	11.1	11.7	9.6	44.5	31.9	12.7	4.0	2.3	1.7	1.0	.4	.4	.2	.8
Per cent the deaths in special groups were of all deaths, known ages.....		44.5					76.4			19.0			4.6				

* Does not include those cases or deaths where the age was not stated.

TABLE 11.—*Exhibiting in certain age-groups, the numbers of cases and deaths from diphtheria in the year 1901; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths, also totals for the 9 years, 1892-1900. Compiled from all reports for the years 1892-1901, which stated the ages.*

Year.		Total No. included.	Per cent of cases and deaths in certain age-groups.											
			All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1901.	Cases.....	1,988	100	26.0	31.4	18.6	8.8	5.1	3.3	3.0	1.7	.9	.7	.6
	Deaths.....	479	100	44.5	31.9	12.7	4.0	2.3	1.7	1.0	.4	.4	.2	.8
1892-1900.	Cases.....	20,170	100	25.9	32.6	18.6	8.4	4.7	3.4	2.5	1.6	1.0	.6	.6
	Deaths.....	4,404	100	44.2	33.3	13.4	4.3	1.8	1.1	.7	.4	.2	.2	.3

Of the 20,170 persons sick with diphtheria in the State during the eight years, 1892-1900, the ages of whom were reported to this office, the largest percentage were of ages ranging from five to nine years; and seventy-seven per cent of the whole number were of ages under fourteen years.

Of the 4,404 deaths reported to have occurred during the same period the greatest percentage were of ages under five years, and ninety-one per cent died at ages under fourteen years.

TABLE 12.—*Exhibiting, by sex, the per cent of persons in certain age-groups who recovered from diphtheria, in Michigan in 1901, and during the 8 years 1893-1900, also the average age and the number of cases included. Compiled from such reports as stated the ages.*

Year.	Sex.	Average age of non-fatal cases, years.	No. of cases included.	Age.—In periods of years. Per cent of (non-fatal) cases in each period of age.											
				All ages.	Under five years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1901.	Males.....	11.4	695	100	21.9	32.7	19.6	10.5	5.0	4.0	2.9	1.9	.7	.6	.3
	Females..	12.7	814	100	18.6	30.1	21.3	10.2	6.9	3.7	4.2	2.2	1.4	.9	.6
1893-1900.	Males.....	10.7	6,672	100	22.7	35.2	20.4	8.9	4.3	3.0	2.1	1.5	.9	.5	.4
	Females..	13.3	7,940	100	16.9	30.4	21.2	10.2	6.6	4.7	3.8	2.7	1.6	.7	1.1

Table 11 shows for 1901 that the average age of non-fatal cases of diphtheria was, for males, 11.4 years, and for females 12.6 years; and that for the eight years, 1893-1900, the average age of males was 10.7 and for females 13.3 years. Also that for both the year 1901 and for the period of years 1893-1900, the greatest per cent of cases occurred at ages ranging from five to nine years.

138 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 13.—*Exhibiting, by sex and in certain age-groups, the per cent of persons who died from diphtheria in Michigan in 1901 and during the 8 years 1893-1900; also the average age at death, and the number of deaths included. (Compiled from such reports as stated the ages.)*

Deaths from diphtheria.									
Year.	Sex.	Average age, years.	No. of deaths included.	Ages.—In periods of years. Per cent of deaths in each period of age.					
				All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.
1901.	Males.....	7.8	251	100	47.0	29.1	12.0	4.8	2.0
	Females.....	7.3	228	100	41.7	35.1	13.6	3.1	2.6
1893-1900.	Males.....	6.6	1,842	100	45.1	34.7	12.3	4.5	1.6
	Females.....	7.4	2,086	100	39.7	34.1	15.3	4.6	1.8

Table 13 shows for 1901 that the average age of decedents from diphtheria was, for males 7.8 years, and for females 7.3 years; and for the eight years 1893-1900 that the average age of decedents from diphtheria was, for males 6.6 years and for females 7.4 years. Also that the greatest per cent of decedents, both in 1901 and in the period 1893-1900, were of ages under five years.

TABLE 14.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from diphtheria, in Michigan, during the year 1901, and in the 8 years 1893-1900. Per cent of deaths arranged in five-day groups. Compiled from those reports which stated the length of time the patient was sick.*

Fatal cases of diphtheria.									
Year.	Sex.	No. of cases included.	Duration of sickness.—Per cent of deaths in each period of days.						
			All cases.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.
1901.	Males.....	159	100	64	22	6	3	3	1
	Females.....	158	100	53	26	16	1	2	1
1893-1900.	Males.....	1,184	100	51	29	11	5	1	.4
	Females.....	1,353	100	52	28	12	5	2	.7

In 1901 the average duration of fatal cases of diphtheria was for males 6.9 days, for females 6.8 days, and for both sexes 6.9 days.

TABLE 15.—*Exhibiting, by sex of patient, the duration (in days) of non-fatal cases of sickness from diphtheria, in Michigan, during 1901 and the 8 years 1893-1900. Per cent of non-fatal cases arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-fatal cases of diphtheria.											
Year.	Sex.	No. of cases included.	Duration of sickness.—Per cent of non-fatal cases in each period of days.								
			All periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 days and over.
1901.	Males.....	524	100	14	33	20	13	9	5	2	3
	Females.....	627	100	10	35	20	14	11	3	3	3
1893-1900.	Males.....	4,272	100	12	34	24	13	10	4	2	3
	Females.....	5,123	100	11	34	24	14	10	4	1	2

In 1901 the average duration of non-fatal cases of diphtheria was, in males, 13.6 days, in females, 14.0 days, and in both sexes 13.8 days.

TYPHOID FEVER IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1901.

During the year ending December 31, 1901, there were reported to the Secretary of the State Board of Health 978 outbreaks of typhoid fever in 725 localities in Michigan in which there were reported to have occurred 3,002 cases, including 665 deaths. Of these deaths, fifty-one were reported to have been from typhoid pneumonia.

Notwithstanding the marked improvement secured both in promptness and in accuracy of reports of local health officials to the central office, not all cases of sickness from typhoid fever are yet reported. Statistics of the relation of deaths to cases in hospitals generally indicate that usually there are about ten cases to one death; therefore it is probable that there occurred in Michigan in 1901, six thousand six hundred and fifty cases of typhoid fever. Reports of all cases cannot be made by local health officers until the people generally fully understand the need of reporting to the local health officer every case of sickness from this "disease dangerous to the public health," for such typhoid fever really is. The restriction of the disease cannot be effected until such reports are made; as soon as the people generally shall coöperate, the disease will be restricted.

Not only about one-half of the cases, but not even all the deaths are reported directly to the office of the Secretary of the State Board of Health by local health officers.

The Vital Statistics Division of the State Department reports to the State Board of Health each month the deaths from dangerous communicable diseases including typhoid fever, typho-malarial fever and typhoid

pneumonia; therefore, a considerable proportion of the deaths shown to have been reported to the State Board of Health were first reported to the State Department. It is believed that nearly all deaths that occur are now, under the new law, reported to the Secretary of State; and of these about two-thirds of all the deaths, reported to the Secretary of State, are found to have been previously reported to the Secretary of the State Board of Health, nearly all of them promptly as the cases of sickness have occurred. And the proportion of the deaths found to have been reported as cases of sickness is constantly increasing.

Definition of the term "outbreak" as used in this article.—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area.

TYPHOID FEVER IN 1901 COMPARED WITH PREVIOUS YEARS.

Comparisons with previous years, to ascertain the comparative increase or decrease of the prevalence of typhoid fever in this State, are interesting and instructive, and they would be more so if there existed a fixed basis on which to found such comparisons. From year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by the local health officials throughout the State to furnish in their reports the information desired by the State Board. It is, however, still impossible to determine the exact increase or decrease of prevalence of the disease in this State by comparisons of the numbers of outbreaks of the disease, and the cases reported to this office year by year. But by means of the statistics of *deaths* it will soon be possible to make comparisons one year with another; because under the new law nearly all the deaths are returned to the Secretary of State, and by using the statistics of those in connection with the statistics of the office of the State Board of Health, a basis of comparison of the years will soon be possible. Some of the difficulties in the way of the immediate accomplishment of this are the different methods of compiling in the two offices; thus, for instance, a few deaths considered by the office of the State Board of Health as from typhoid fever were *probably* compiled in the State Department as from pneumonia, the returns reading "typhoid pneumonia."

A COMPARISON OF DEATHS FROM TYPHOID FEVER IN MICHIGAN DURING THE YEAR 1901, REPORTED TO THE OFFICE OF THE STATE BOARD OF HEALTH, WITH THOSE REPORTED TO THE DIVISION OF VITAL STATISTICS, IN THE STATE DEPARTMENT.

Reported to the State Board of Health.

Deaths from typhoid fever and typho-malarial fever in 1901 (also includes those deaths reported first to the Secretary of State.. 665

Reported to the State Department, Division of Vital Statistics.

Deaths from typhoid fever in 1901 (includes typho-malarial fever). 635

The foregoing statement is based upon the ephemeral publication, the Bulletin of Vital Statistics; the final compilation of typhoid fever by the State Department Division of Vital Statistics in 1901 has not yet been completed, so that the figures given (635) may be changed later, because where two diseases are mentioned as causing a death, as not infrequently occurs, not always the same one is used in the final compilation as in the Bulletin of Vital Statistics.

The facts exhibited in Table 1, show that the reported outbreaks, cases of sickness, and deaths from typhoid fever in 1901, exceeded the averages for the fifteen years, 1886-1900; also that the numbers of deaths per 100 cases, and the final reports received relative to typhoid fever were more; but it is encouraging to note that the cases and deaths per outbreak were less in 1901 than the averages for the preceding years, indicating that the efforts for the restriction of this disease are having their proper effect.

TABLE 1.—TYPHOID FEVER.—*Exhibiting the numbers of outbreaks, localities, cases and deaths reported for the year 1901; also for the years 1886-1900 the average reported outbreaks, localities, cases and deaths, and the average cases and deaths per outbreak, the deaths per 100 cases, and the number of special final reports received.*

Year.	Outbreaks reported.	Localities reported.	Cases reported.	Deaths reported.	Average cases per outbreak.	Average deaths per outbreak.	Deaths per 100 cases.	Final reports received.
1901.....	978	725	3,002	665	3.07	.68	22	805
Averages 1886-1900	581	502	2,901	508	4.99	.87	18	327

Sickness-rates from reported typhoid fever in 1901.—The reporting of cases of sickness from typhoid fever is not yet as complete as the reporting of deaths from that disease, therefore any comparisons made should be subject to the mental reservation that not all cases are reported, and that it is probable that the omissions are greater in some parts of the State than in others.

Table 2 shows that the sickness-rate from reported typhoid fever for the State in 1901 was 12.25 cases per 10,000 of population. The county having the greatest reported sickness rate was Oscoda, with 162.89 cases per 10,000 population—over thirteen times the average rate for the State. The adjoining county, Crawford, had the next highest rate, 110.70 cases per 10,000 population, which rate was more than double that of Lake county (41.68), the county having the next highest rate.

Death rates from reported typhoid fever in 1901.—The death-rates are now believed to be fairly accurate. Table 2 shows that the death-rate from reported typhoid fever in 1901, for the State, was 2.71 per 10,000

142 STATE BOARD OF HEALTH—REPORT OF SECRETARY. 1902.

of population. The county having the highest death-rate (10.06) was Crawford, and that having the lowest (where deaths occurred), .55 of one death per 10,000 of population, was Alpena.

TABLE 2.—Numbers of cases and deaths reported from typhoid fever, and the cases and deaths per 10,000 persons living in each county in Michigan during the year 1901. (Compiled from reports of health officers, etc.)

State and counties.	Estimated population of Michigan for 1901.*	Number of reported		Number per 10,000 population, of		Counties.	Estimated population of Michigan for 1901.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,450,872	3,002	665	12.25	2.71	Keweenaw ..	3,285	0	0	0	0
						Lake	4,799	20	2	41.68	4.17
Alcona.....	5,736	3	2	5.23	3.49	Lapeer.....	27,434	29	12	10.57	4.37
Alger.....	6,613	8	0	12.10	0	Leelanau....	10,719	14	1	13.61	.93
Allegan.....	38,748	20	4	5.16	1.03	Lenawee.....	48,382	71	14	14.67	2.89
Alpena.....	18,343	7	1	3.82	.55	Livingston...	19,534	56	8	28.67	4.10
Antrim.....	17,256	32	6	18.54	3.48	Luce.....	3,088	4	1	12.95	3.24
Arenac.....	10,300	0	0	0	0	Mackinac....	7,780	15	2	19.28	2.57
Baraga.....	4,335	8	0	18.45	0	Macomb.....	33,386	32	11	9.58	3.29
Barry.....	22,315	28	6	12.55	2.69	Manistee....	28,145	22	8	7.82	2.84
Bay.....	62,556	43	9	6.87	1.44	Marquette...	41,776	44	7	10.53	1.68
Benzie.....	9,953	6	2	6.03	2.00	Mason.....	18,961	16	5	8.44	2.64
Berrien.....	49,752	46	11	9.25	2.21	Mecosta.....	20,687	17	6	8.22	2.90
Branch.....	28,077	22	7	7.84	2.49	Menominee..	27,595	58	9	21.02	3.26
Calhoun.....	49,621	106	26	21.36	5.24	Midland.....	14,642	31	9	21.17	6.15
Cass.....	20,826	47	6	22.57	2.88	Missaukee....	9,698	29	2	29.90	2.06
Charlevoix...	14,337	29	9	20.23	6.28	Monroe.....	32,682	32	11	9.79	3.37
Cheboygan...	15,875	20	3	12.60	1.89	Montcalm....	32,519	22	4	6.77	1.23
Chippewa....	22,338	37	12	16.56	5.37	Montmorency	3,366	5	1	14.85	2.97
Clare.....	8,423	2	0	2.37	0	Muskegon....	36,988	41	11	11.08	2.97
Clinton.....	24,947	43	5	17.24	2.00	Newaygo....	17,430	21	6	12.05	3.44
Crawford....	2,981	33	3	110.70	10.06	Oakland.....	45,144	22	7	4.87	1.55
Delta.....	24,649	67	12	27.18	4.87	Oceana.....	16,651	9	3	5.40	1.80
Dickinson...	18,421	9	4	4.89	2.17	Ogemaw.....	8,119	1	3	1.23	3.70
Eaton.....	31,509	57	7	18.09	2.22	Ontonagon...	6,083	23	1	37.81	1.64
Emmet.....	16,854	63	4	37.38	2.37	Osceola.....	18,089	8	4	4.42	2.21
Genesee.....	42,012	49	9	11.66	2.14	Oscoda.....	1,412	23	0	162.89	0
Gladwin....	6,840	15	1	21.93	1.46	Otsego.....	6,404	16	2	24.86	3.12
Gogebie.....	17,180	13	6	7.57	3.49	Ottawa.....	39,763	43	13	10.81	3.27
Gd. Traverse.	20,972	29	8	13.83	3.81	Presque Isle.	9,304	18	7	19.35	7.52
Gratiot.....	30,074	42	13	13.97	4.32	Roscommon..	1,808	0	0	0	0
Hillsdale....	29,795	34	9	11.41	3.02	Saginaw.....	81,117	122	25	15.04	3.08
Houghton...	66,708	92	26	13.20	3.73	Sanilac.....	35,239	44	4	12.49	1.14
Huron.....	34,479	22	4	6.38	1.16	Schoolcraft..	8,015	5	1	6.24	1.25
Ingham.....	39,839	116	17	29.12	4.27	Shiawassee...	34,034	31	4	9.11	1.18
Ionia.....	34,246	36	8	10.51	2.34	St. Clair.....	55,378	119	24	21.49	4.33
Iosco.....	9,895	8	3	8.08	3.03	St. Joseph...	23,688	19	5	8.02	2.11
Iron.....	9,605	4	3	4.16	3.12	Tuscola.....	36,135	32	7	8.86	1.91
Isabella.....	23,007	23	8	10.00	3.48	Van Buren...	33,641	26	8	7.73	2.38
Jackson.....	48,502	106	16	21.85	3.30	Washtenaw...	48,469	35	10	7.22	2.06
Kalamazoo...	44,685	87	13	19.47	2.91	Wayne.....	358,179	178	71	4.97	1.98
Kalkaska....	7,381	2	1	2.71	1.35	Wexford.....	17,310	19	13	10.98	7.51
Kent.....	131,008	216	30	16.49	2.98						

* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

Typhoid fever in each month of the year 1901.—The last line in Table 3 shows the number of outbreaks present in each month of the year. As many outbreaks lasted more than one month they are counted in each month of their duration; consequently the sum of the outbreaks present in the several months exceeds the total number of reported outbreaks.

TABLE 3.—*Exhibiting the number of outbreaks of typhoid fever reported to have begun, to have ended, and to have been present, in each month of the year 1901, in Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Outbreaks began.	57	33	44	35	33	41	74	128	178	108	55	45	831
Outbreaks ended.	108	58	61	57	44	33	34	61	91	139	129	118	933
Outbreaks present	212	141	131	120	100	98	137	233	327	352	277	195	.....

TABLE 4.—*Exhibiting the number and per cent of cases of typhoid fever in Michigan in each month during the year 1901. (Includes each case for which the time during which it existed, was stated in reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases sick in any part of the month...	235	242	231	201	156	133	195	411	726	787	583	380
Per cent the cases sick in each month were of total reported cases....	8	8	8	7	5	4	6	14	24	26	19	13

The first line of figures in Table 4 shows the number of cases reported sick in any part of each month. As some of the cases were sick longer than one month, they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1901; and as the last line of figures in this table shows the per cent the cases sick in each month were of the exact number of cases reported to this office in 1901, the sum of the figures in the last line of the table exceeds 100.

Source of contagium of typhoid fever.—Of the 3,002 reported cases of typhoid fever in 1901, the local health officer stated the source of contagium to be as follows:

Traced to former cases, 144; attributed to infected, contaminated, or surface water, 593; cases reported as coming from outside jurisdiction, 251; from probable outside jurisdiction, 26; attributed to filthy or unsanitary conditions, 64; contaminated milk or food supply, 14; cases, the source of contagium of which was reported as unknown, 1,287; cases, the source of contagium of which was not reported, or the statements were too indefinite for classification, 620; from flies, 3; total, 3,002.

An epidemic of typhoid fever at We-que-ton-sing, Little Traverse township, Emmet county.—August 29 and 30, 1901, John W. Alvord, Sanitary Engineer, Chicago, Illinois, at the request of Mrs. C. H. Eaton, proprietress of Colonial Hall, We-que-ton-sing, a summer resort in Little Traverse

township, Emmet county, went to examine the sanitary condition of the Hall and if possible to locate and prevent the continuance of an epidemic of typhoid fever which had prevailed there since the 18th of July. He made an examination of the Hall and found that all of the ordinary precautions had been taken to prevent any unsanitary condition. That the plumbing in the interior of the house seemed to be in good condition and operated effectively, and that the sewage by means of a four inch wrought iron pipe is carried to a point where its purification by dilution is promptly effected.

Relative to the water supply of the Resort, Mr. Alvord writes as follows:

"The water supply of the Resort is derived from two sources, that most in use being obtained from a driven well in the rear of the premises, some 150 feet in depth, which penetrates several layers of very hard clay, and terminates in a strata of gravel containing water under such pressure that the flow rises three or four feet above the level of the surface of the ground, and flows continuously at the rate of ten or fifteen gallons per minute. The water from the well comes from a depth of forty-nine feet. The analysis of the water shows a pure soft potable drinking water, such as is not often obtained for drinking purposes in thickly settled localities, where it is in demand.

"A second source of water supply for your Resort consisted in water delivered from the city of Harbor Springs, through the water mains of the village.

"The water works pumping station is provided with a direct connection to the bay, by which water is drawn into the system upon emergencies when fires occur, when the ordinary supply is not sufficient, and it has been suggested that some contamination might have been possible from this source. I found, however, that in times of fire the upper reservoir had to be entirely shut off in order to provide increased pressure, therefore the only contamination that can be effected is in the city mains, especially in the vicinity of the fire. There was a serious fire in Harbor Springs during July at which time, the water works engineer informs me, the lake inlets were open forty-five minutes. It is possible that at this time some contagion might have been conveyed to the water used in We-que-ton-sing, but it is, to say the least, singular that of the twenty-seven typhoid fever cases, which have occurred, all have been among guests at the Resort, and no one drinking water exclusively from city sources either in Harbor Springs, or We-que-ton-sing, has been so far taken with the infection, so far as known. It seems to me, therefore, that the possibility of this having been the cause of the trouble is remote."

The analysis of the city water was made on October 13, 1900, by Messrs. Dickman and Mackenzie, as follows:

ANALYSIS OF CITY WATER.

	Grains per gallon.
Sodium chloride	0.96
Calcium sulphate.....	0.49
Sodium carbonate.....	2.60
Calcium carbonate.....	5.94
Magnesium carbonate.....	3.28
Silica .....	.37
Iron oxide and alumina.....	.20
Organic matter.....	2.71
Total	16.55

Messrs. Dickman and Mackenzie remark, in connection with this analysis, that the large amount of organic matter shown renders the water unsafe for drinking purposes.

Bacterial tests were made by Mr. Alvord. He says of the result:

"Such tests as I made did not, of course, show the absolute absence of the specific germ of typhoid, but its presence would be rather inferred as being improbable from the generally low numbers of bacteria."

Mr. Alvord visited the milk farm located about four miles north of the Resort where the entire milk supply was delivered to the Resort. His visit to the farm showed that the sanitary conditions there were excellent. He could not believe, after seeing the place, that any serious contamination could be derived from it, unless all other sources of possible infection were proved to have been impossible.

Relative to the contamination by means of flies, Mr. Alvord writes as follows:—

"The importance of the house fly as a source of contamination in typhoid has been demonstrated in recent years, and it has been shown that in the soldiers' camps, in the Cuban war, that flies were largely responsible for the epidemic of typhoid which universally prevailed. It was clearly proven through the use of lime in the urinals and closets that the fly was capable of conveying the contagion, as flies were seen about the kitchen and bakeries with lime upon their feet. Since this discovery there has been much attention given to this source of infection, and it is found that where flies are responsible there are little neighborhood epidemics, extending in short leaps from house to house without reference to the water supply, or anything else in common. Epidemics spread by flies tend to follow the direction of prevailing warm winds, as though the fly wandering outdoors after contact with some sort of infection, had drifted with the wind. In villages and camps where open closets are in use, giving access to the flies, they are the chief medium of the conveyance of disease. In cities where underground sewers carry such material beyond the ordinary reach of flies (whose migrations are not extensive) zymotic diseases can only become very prevalent through infection of the source of public water supply. Hence, in villages and camps they are quite often fly-borne, while in cities they are usually water-borne. When a source of water supply has been infected, cases of disease will occur, more or less, throughout the year, but with the conveyance by flies prevalence of the disease will be confined to a particular season, thus in cities typhoid fever prevails at all seasons, while in villages it is usually an autumnal disease. When the weather is dry and sultry, flies have their best opportunity to carry the disease.

"With this general understanding of this source of contamination considerable attention was given to the question of infection of this source on your premises. The kitchen help used a common cesspool about 100 feet or more from the rear of the house, and the windows of the kitchen not being screened, it is just possible with the more numerous appearance of the flies late in the season that this might have been at least a perpetuation of the trouble. It was represented to me, however, that flies are not generally prevalent in We-que-ton-sing until late in August, and that the first three cases occurred about the 18th to the 24th of July. Moreover none of the cottages of the neighborhood have taken any unusual precaution against this source of infection, yet no case of typhoid has occurred outside of your Resort, except one, in a distant part of the settlement, that was directly traced to outside sources, and in fact came with symptoms of typhoid. There is nothing of the local neighborhood epidemic which usually is found where flies are a source of contamination, and in the light of all the facts I cannot be convinced that this could have directly influenced the outbreak, although, here, as in the supply of milk, there is some reasonable doubt."

Relative to the period of incubation of some of the cases sick with typhoid fever at We-que-ton-sing, Mr. Alvord wrote:

"Some study of the cases was made to observe whether, if possible, the infection had been brought in from outside. Three earlier cases were a Mr. Taylor, arrived at We-que-ton-sing, from Louisville, about July 9, taken sick about the 24th. Miss Mabel Stebbins, one of the help, came from Southern Michigan July 11, taken sick about August 1st, and Miss Ruth Loring, a young lady from St. Louis, who had been in your Resort since early in June, visited the Buffalo Exposition and had returned to We-que-ton-sing July 10. She was taken sick on or about the 18th.

"Now, the infection in typhoid fever arises from the presence of a specific germ which has been identified and is capable of being distinguished from other germs. This germ ordinarily must be taken into the stomach in order to propagate the disease. Foul odors or other emanations do not produce infection, but water which is infected is supposed to account for a large proportion of cases which have been traced, while contaminated milk, flies and other causes are responsible for the remainder.

"The period of incubation in typhoid fever is about two weeks from the time of infection, but it may be from seven to twenty-one days. In each of these three original cases there is a possibility that the infection was brought from without, especially is it possible that Miss Loring visiting the Buffalo Exposition, where typhoid fever is usually prevalent at the present time, might have brought the infection from there, but the probabilities seem to be strong that three cases, culminating at the same time among the people who have come from widely separated parts, and who have been at Colonial Hall a sufficient length of time to become infected with the disease and develop it there, had in all probability derived the infection in and around the Resort."

Relative to the cause of the outbreak of typhoid fever at Colonial Hall, Mr. Alvord wrote to Mrs. Eaton as follows:

"The specific cause for the outbreak of typhoid fever at your Resort seems to me to have been clearly due to an accidental arrangement in the water supply from your flowing well, by which it became immediately contaminated before being pumped into the upper galvanized tank, which supplies the kitchen. The water from the flowing well ordinarily overflowed into two shallow wooden tanks from which it wasted into a connection with the sewer, but by turning a valve in the main well pipe this overflow was cut off and the water then passed directly through a horizontal pipe at a distance of about twenty-five feet and overflowed into a wooden tank three feet in diameter and seven feet deep, set below the level of the ground.

"Two or three times a day the water from this wooden tank was pumped up into an upper galvanized tank from which it was fed into the house and kitchen. The wooden tank in the ground was immediately adjacent to a shallow sewer (about three feet distant) the depth of which was about three feet below the surface, and when pumping was resorted to, the ordinary delivery of the well not being sufficient to supply the pump, the water in the wooden tank fell to a level of three or four feet below the level of the sewer, and an inflow of ground water contaminated from the sewer was created.

146 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

"In order to demonstrate this fully, plate cultures were made of water from the kitchen tap—two samples—and from the water within the wooden tank—one sample—as follows:

"Results of tests on contaminated water.

"Sample No. 10 from wood tank, bacteria per cubic centimeter.....	1590
"Sample No. 11 from galvanized iron tank, bacteria per cubic centimeter..	940
"Sample No. 12 kitchen tap, bacteria per cubic centimeter.....	340
"Sample No. 13 kitchen tap, bacteria per cubic centimeter.....	980

"These samples show that the water from the flowing well in passing down into the buried wooden tank before being pumped up into the galvanized iron tank above had become seriously contaminated, comparison being made with the tests taken from the water from the flowing well which have been previously given.

"In order to demonstrate still further the fact of this contamination, the wooden tank was pumped out nearly dry so that the level of its water was four feet below the level of the adjacent sewer. Careful measurement was then taken of its level at the beginning, middle and end of four hours, and the infiltration determined to be at the rate of nine gallons in twenty-four hours, a sufficient amount to explain all the difficulties and disaster which has occurred at Colonial Hall this summer."

In conclusion of Mr. Alvord's report relative to his investigation of the sanitary conditions at Colonial Hall, We-que-ton-sing, he suggests the following remedies:—

"In order to effectually put a stop to any further contamination, I have suggested to your plumber the construction of a cement tank, whose bottom shall be well above the ground water, so that when empty there shall be no possibility of leakage from infiltration of contaminated ground water, but the probability on the other hand of outward leakage in case of any imperfection of the tank. This tank is to be so arranged as to be emptied as often as desirable, and provided with a suitable cover, and enclosed in such a manner that it may not easily be tampered with. From this tank the water may be safely pumped, as is now the case, to the upper galvanized iron tank, without danger of contamination. I believe this will effectually remedy any difficulty which you have experienced and insure you against any possibility of further attacks of zymotic diseases.

"I have made some general suggestions to you on the ground for immediate disinfection of kitchen utensils, and flush closets, as well as the improvement and disinfection of main sewer leading from the house to the lake. It may be desirable to repeat these suggestions here, as follows:

"1st. Pour one barrel of disinfectant into the sewer at the grease trap. Disinfectant to be one pound of sulphate of copper dissolved in a barrel of soft water, and allowed to stand two hours before being used.

"2d. Pour one barrel into the manhole in the street.

"3d. Pour several gallons into each flush tank and waste water sink, and at least one half barrel into the old cesspool.

"4th. I would suggest that the old cesspool be cleaned out and the contents moved as soon as possible, and its use discontinued, and that the help be provided with flush closets.

"5th. I would suggest that the manhole in the main sewer in the street is not properly constructed, but is now in the form of a catch basin. I would suggest that it be cleaned out and a channel laid in its bottom so as to prevent further detention of material in it.

"6th. I would suggest that the garbage barrels be moved as far as possible from the kitchen, and that the kitchen windows and doors be suitably screened. Kitchen utensils not in common use for boiling or cooking should be immersed with boiling water thirty minutes, twice a week, for some weeks to come.

"7th. I would suggest using drinking water from the city tap and for cooking or domestic purposes until changes can be made in the pumping arrangements before described. Or, what would amount to the same thing, the use of running water taken directly from the flowing well. This, I understand, has been the method of obtaining drinking water for table use.

"In conclusion, I would say, that the general situation and environment of your Resort would seem to me one which is suggestive of the utmost healthfulness as regards sanitary matters, with such excellent drinking water on the premises and good drainage and plumbing, the unhappy experience to which you have been subjected this season cannot be regarded in any other light than that of an unfortunate and temporary accident, the nature of which it would have been difficult for any one, but an expert in such matters, to have foreseen and forewarned you of."

Typhoid fever in Harbor Springs village, Emmet county.—Dr. E. A. Runyan, health officer of Harbor Springs village, in his final report sent to this office, attributes the cause of the outbreak in that vicinity to impure water. He writes:—

"Germ was found in overflow tank of flowing well. (Probably from last year's case which was kept quiet for business reasons.) All came down about the same time. A number went home on first symptoms. Tanks and sewerage ordered repaired then cause disappeared."

November 27, 1901, the secretary of this Board wrote to Dr. Runyan as follows:—

"Referring to your final report relative to typhoid fever in Harbor Springs village, you state in a foot note— 'the germ was found in an overflow tank of flowing well.' I should be

pleased to learn who made the bacteriological examination and found the germ, and the date that the sample was taken for analysis. If there are any other facts not mentioned in connection with this interesting point I shall be pleased to be advised of them."

December 9, 1901, Dr. Runyan wrote to the secretary relative to this outbreak as follows:—

"The typhoid germ was found in the tank of the flowing well. The waiters would dip the pitchers into the tank instead of catching it from the well. The owners sent to Chicago for a couple of sanitary plumbers and experts. No germs were found in water from well direct but in both of the tanks. There had been a case on the premises in September 1900."

Dr. Runyan was not able to learn the names of the sanitary experts.

Contagium of typhoid fever attributed to contaminated water.—May 29, 1901, Dr. A. B. Conklin, health officer of Elk Rapids village, Antrim county, in reporting a case of typhoid fever, wrote:—

"Another outbreak of typhoid fever has occurred and this time I am unable to determine its origin unless it be from our public water. We have a water system, the intake pipe to which is laid in Elk river, which stream is polluted at and below a certain point by refuse from a wood alcohol plant and by a little stream, the outlet of a small lake, near which last winter was one or two cases of typhoid fever, one of which was fatal. Along this little stream, which runs through a swamp, any amount of rubbish has been dumped and directly near it at one point is situated a privy for the accommodation of the employees of the works above mentioned. Sewage also enters Elk river from an Iron Furnace plant just below the Wood Alcohol Works. A large mercantile establishment also runs its sewage from two water closets and a urinal into this river below iron plant. Numerous tugs (3), passenger boats (2), and a boarding scow for lumbering hands ply upon this stream; logs are boomed in it. A sewer from a passenger depot, F. & P. M. Ry., empties into it also. The intake pipe to the water works runs along the same shore of the river upon which is situated these various sources of sewage. It was discovered yesterday that the intake pipe was parted just above the plant and at a point in the river below every source of contamination I have mentioned. So you will see we have no doubt been drinking sewage. The question is, then, could this young lady, who has used freely of this water at school, have contracted typhoid fever from this contaminated city water? Did she? I presume I should advise our city board of health to have a sample of the hydrant water sent to Ann Arbor."

May 31, 1901, in reply to the above quoted letter, the secretary wrote to Dr. Conklin as follows:—

"Accept thanks for your outbreak report relative to typhoid fever, and your letter stating facts relative to the probability of the water supply of your village being contaminated. From the facts stated in your communications, I think that there is much probability of the infection having arisen from contaminated water supply, and the question comes to my mind whether Miss Cora Berry, the sick person, would not have an action for damages against the village."

September 20, 1901, Health Officer Conklin again wrote to this office as follows:—

"From the records of the health officer of Elk Rapids village you will observe that we have from time to time a case of typhoid fever. In reporting upon them I am obliged to confess that the source of the disease is unknown and the manner of introducing it into our jurisdiction is unknown. In fact, it cannot, I think, be claimed that the disease has been introduced into the jurisdiction from without. I am led to believe that these isolated cases originate wholly within the village. Now the question, how? why? Some of the cases occurred in buildings not especially sanitary, i. e., damp, but none of the cases had been using water from a well. All had been using *hydrant water*, and this water has twice during the summer been analyzed at Ann Arbor and reported to contain a 'Colon like bacterium' and to be 'unfit for domestic use unboiled.' I can think of no other source of these cases than this bad drinking water. I have posted notices of warning about the town and have the same standing continuously in the local paper. What more can I do? Can you do anything? The system is being overhauled and may be all O. K., when done."

September 21, 1901, Secretary Baker wrote to Dr. Conklin:—

"Accept thanks for your favor of September 20, relative to the frequent occurrence of cases of typhoid fever, and the cause of it. I am pleased to be advised of what you are doing for its prevention. I offer a suggestion. If your local board of health would make a *complete* and *thorough* distribution of printed leaflet directions and suggestions, to the citizens of your village, it might and undoubtedly will be of benefit. By this mail I send you fifty copies of our pamphlets on the subject, which I trust you will distribute to the *neighbors of infected and placarded premises*. I shall be glad to send you more copies if you will use them to the public advantage. There can be no doubt that this method of work by means of a 'campaign of education' is the most effective method for the restriction of typhoid fever or any other dangerous communicable disease."

148 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 5.—*First, second and third localities, where the second locality was infected with typhoid fever from the first, and the third was infected from the second; and the number of cases and deaths from typhoid fever in the first, second and third localities with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of the contagium to other localities.)*

First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Alpena county: Alpena city.....	6	1	Montmorency county: Briley township.....	1	1			
Antrim county: Elk Rapids village..... (May 21-Oct. 7.)	4	1	Leelanau county: Sutton's Bay township (Sept. 2-Dec.)	8	1			
Antrim county: Mancelona village.....	1	1	Kalkaska county: Kalkaska village.....	1	0	Manistee county: Manistee township.. (Oct. 4-Oct. 21.)	1	0
Arenac county: Standish village.....	*	....	Mecosta county: Chippewa township...	1	0			
Bay county: Bay City..... (Jan. 1-Dec. 31.)	10	5	Antrim county: Central Lake village.. (June 3-Sept. 21.)	2	0			
Benzie county: Frankfort village..... (— April 6.)	1	1	Saginaw county: Fremont township..... (Oct. 15-Nov. 18.)	1	0			
Benzie county: Thompsonville village.	1	0	Manistee county: Pleasanton township.. (July 8-Sept. 30.)	2	0			
Berrien county: Oronoko township..... (Berrien Springs.)	*	....	Newaygo county: Grant township.....	1	0			
Berrien county: St. Joseph city.....	1	0	Charlevoix county: South Arm township.. (July-July 26.)	1	1			
Branch county: Bronson township.....	2	0	Berrien county: Benton township.....	1	0			
			Branch county: Coldwater township.. (Sept. 20-Nov. 15)	1	0			
			Barry county: Maple Grove township (Sept. 10-Oct. 23.)	1	0			
Calhoun county: Battle Creek city..... (Jan. 1-Dec. 31.)	46	12	Calhoun county: Emmet township..... (Dec. 1-Dec. 25.)	1	0			
			Eaton county: Eaton township..... (Aug. 8-Jan., 1902.)	3	0			
			Kent county: Byron township..... (Sept. 4-Oct. 2)	1	0			
			Midland county: Warren township..... (Sept. 18-Nov. 30.)	3	2			
Calhoun county: Homer village..... (Aug. 2-Oct. 18.)	5	0	Calhoun county: Clarendon township... (Oct. 30-Nov. 14.)	1	0			

* Typhoid fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 5.—CONTINUED.—*Movement of infection of typhoid fever.*

First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Cass county: Dowagiac city..... (Sept. 3-Dec. 31.)	10	2	Berrien county: Niles township..... (Sept. 5 Oct. 29.)	2	0			
Charlevoix county: Charlevoix village.....	3	1	Osceola county: Reed City village.....	1	0			
Charlevoix county: Peaine township..... (Beaver Island.)	*	....	Charlevoix county: St James township... (Sept. 3-Oct. 20.)	2	1			
Cheboygan county: Cheboygan city.....	1	1	Huron county: Verona township.....	7	0			
Cheboygan county: Munro township.....	*	....	Emmet county: Cross village township (Mar. 5-Mar. 27)	1	0			
Cheboygan county: Nunda township..... (May 8-July 2.)	12	0	Otsego county: Corwith township..... (Sept. 26-Oct. 21.)	1	0			
Cheboygan county: Waverly township..... (Sept.-Jan. 1, 1902.)	1	0	Presque Isle county: Onaway village.....	14	5	Midland county: Coleman village..... (Sept.-Dec. 1.)	2	1
Chippewa county: Raber township.....	2	0	Jackson county: Napoleon township....	1	1			
Chippewa county: Rudyard township.....	5	0	St. Clair county: Yale village.....	3	0			
Clare county: Redding township.....	*	....	Isabella county: Coldwater township... (Oct. 1-Nov. 10.)	2	2			
Clinton county.....	....	....	Ionia county: Lyons township..... (Oct. 4-Oct. 15.)	1	1			
			Antrim county: Helena township..... (Sept.-Nov. 10.)	2	1			
			Star township..... (Sept. 16-Nov. 18.)	4	1			
Crawford county: Frederic township..... (Sept. 6-Dec. 4.)	28	2	Crawford county: Grayling township.... (Oct. 12-Nov. 9.)	1	0			
			Mecosta county: Martiny township.... (Sept. 28-Oct. 21.)	1	0			
			Otsego county: Corwith township..... (Aug. 13-Sept. 15.)	1	0			
Crawford county: Maple Forest township (Oct. 18-Dec. 28.)	2	0	Huron county: Lincoln township..... (Nov. 20-Dec. 18.)	1	0			
Delta county: Gladstone city..... (June 14-Dec. 28.)	35	4	Delta county: Escanaba city..... (Sept. 14-Oct. 8.)	2	2			

* This foot-note is on the bottom of the first page of this table.

150 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 5.—CONTINUED.—*Movement of infection of typhoid fever.*

First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Eaton county: Grand Ledge city..... (Sept. 29-Nov. 5.)	2	1	Hillsdale county: Camden township..... (Oct. 1-Oct. 9)	1	1			
			Ingham county: Lansing township..... (Sept. 1-Sept. 12.)	1	1			
			Livingston county: Unadilla township..... (Oct. 16-Dec. 20.)	1	0			
Emmet county: Petoskey city..... (July 6-Aug. 24.)	1	0	Clinton county: Maple Rapids village.. (Aug. 24-Nov. 10.)	2	0			
Emmet county: Harbor Springs village (July 25-Oct. 30.)	21	0	Montcalm county: Evergreen township... (Aug.-Sept.)	1	1			
			Otsego county: Elmira township..... (Sept. 20-Nov. 1.)	2	0			
Gratiot county: Alma village.....	6	0	Clinton county: Lebanon township.....	2	0			
Gratiot county: Ithaca village..... (Aug.-Aug. 19.)	2	1	Benzie county: Inland township..... (Sept. 26-Oct. 7.)	1	0			
Hillsdale county: Jonesville village..... (Aug. 15-Sept. 15.)	1	0	Barry county: Nashville village..... (Oct. 15-Nov. 5.)	1	0			
Huron county: Caseville township....	2	0	Tuscola county: Gagetown village.....	1	0			
			Allegan county: Lee township..... (Nov. 3 Nov. 12.)	1	1			
			Calhoun county: Clarence township.... (Sept.-Nov. 30.)	1	1			
Ingham county: Lansing city.....	63	7	Eaton county: Windsor township..... (July 28 Nov. 12.)	3	1			
			Ingham county: LeRoy township..... (Aug. 1-Aug. 31.)	1	0			
			Wheatfield township.. (Oct. 12-Jan. 28, 1902.)	5	1			
			Williamston village.... (May 13-June 1.)	1	0			
Ionia county: Ionia city..... (Aug.-Nov.)	2	0	Wayne county: Dearborn township.... (Aug. 4-Sept. 27.)	1	0			
Ionia county: Odessa township..... (Mar. 19-Apr. 13.)	3	1	Ionia county: Ronald township..... (Apr. 10 —)	1	0			
			Sebewa township.....	2	1			
Ionia county: Otisco township.....	*		Montcalm county: Eureka township..... (Oct. 15-Nov. 27.)	1	0			

* This foot-note is on the bottom of first page of this table.

TABLE 5.—CONTINUED.—*Movement of infection of typhoid fever.*

First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Iron county: Iron River township...	*	....	Iron county: Bates township..... (Aug. 12-Aug. 28.)	1	1			
			Berrien county: Buchana village..... (July 22-Oct. 1.)	3	0			
Jackson county: Jackson city..... (Jan. 1-Dec. 31.)	75	12	Jackson county: Concord village..... (Mar. 26-May 1.)	1	0			
			Tompkins township.... (Sept. 15-Oct. 24.)	1	0			
Jackson county: State prison..... (Jan.-Feb.)	9	0	Washtenaw county: Sylvan township..... (Jan. 11-Jan. 26.)	1	1			
Kalamazoo county: Galesburg †.....	*	....	Kalamazoo county: Vicksburg village..... (Sept.-Feb., 1902.)	4	1	Kalamazoo county: Kalamazoo twp.... (Sept. 28-Feb. 10, 1902.)	4	0
Kalamazoo county: Kalamazoo city..... (Jan. 1-Dec. 31.)	61	8	Van Buren county: South Haven village.. (Dec. 3-Jan. 10, 1902.)	1	0			
Kent county: Caledonia † (township) (May 15-July 20.)	3	0	Barry county: Middleville village.... (Sept. 19-Oct. 20.)	1	0			
			Thornapple township.. (Aug. 31-Sept. 26.)	1	0			
			Allegan county: Overisal township.... (Mar. 1-Mar. 18.)	1	0			
			Barry county: Rutland township..... (Dec. 30-Jan. 18, 1902.)	1	1			
			Kent county: Grattan township..... (Aug. 2-Aug. 28.)	1	0			
Kent county: Grand Rapids city..... (Jan. 1-Dec. 31.)	173	32	Montcalm county: Greenville city..... (Oct. 31-Nov. 16.)	1	0			
			Ottawa county: Coopersville village... (Feb. 25-June 22.)	2	0			
			Georgetown township. (Dec. 18-Feb. 18, 1902.)	1	0	Ottawa county: Jamestown twp.... (Oct. 15-Dec. 2.)	2	0
			Washtenaw county: Lima township..... (Nov. 1-Apr. 15, 1902.)	1	0			
			Grand Traverse county: Traverse City.....	1	0			
Lake county: Baldwin village..... (Sept. 19-Nov. 20.)	9	1	Newaygo county: Big Prairie township.. (Sept.-Nov. 15.)	1	0			
			White Cloud village... (Sept. 21-Nov. 10.)	2	0	Antrim county: Elk Rapids village. (Dec. 18-May, 1902.)	7	0
Lapeer county: Imlay township..... (Aug.-Aug. 24.)	2	2	Lapeer county: Almont township..... (Sept. 9-Sept. 21.)	1	1			

* This foot-note is on the bottom of the first page of this table.

† Health officer of second locality did not state whether it was from village or township.

152 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 5.—CONTINUED.—*Movement of infection of typhoid fever.*

First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Lapeer county: North Branch† (twp). (Sept. 6-Oct. 10.).....	1	0	Lapeer county: Mansfield township.... (Oct. 10-Oct. 22.)	1	0			
Livingston county: Howell† (village)..... (Jan.-Dec.)	43	3	Livingston county: Fowlerville village.... (Sept.-Oct. 21.)	1	0			
Macomb county: Erin township..... (Lakeshore) (— July.)	1	1	Marion township..... (Sept. 11-Oct. 25.)	2	1			
Macomb county: Mt. Clemens city..... (Jan. 12-Nov. 10.)	10	2	Kalamazoo county: Brady township..... (Sept. 27 —.)	1	0			
Mason county.....			Macomb county: Romeo village..... (July 30 Oct. 25.)	2	0			
Mecosta county: Mecosta†.....	*		Oceana county: Elbridge township..... (Sept. 15-Nov. 6.)	3	1			
Midland county: Ingersoll township..... (1900-Jan. 26.)	0	1	Charlevoix county: Boyne city village..... (Dec. 1-Dec. 25.)	1	1			
Midland county: Midland city.....	6	2	Midland county: Midland township..... (Dec. 23-Jan. 17, 1902.)	1	0			
Monroe county: Monroe city.....	3	3	Midland county: Midland township.....	6	1			
Muskegon county: Fruitport village..... (— June 4.)	1	1	Ingham county: Leslie village..... (— Dec.)	2	0			
Newaygo county: Denver township.....	*		Muskegon county: Fruitport township..... (Nov. 28-Jan. 4, 1902.)	1	0			
Newaygo county: Fremont (village)†.....	*		Newaygo county: Dayton township..... (Aug. 2-Oct. 25.)	8	2			
Newaygo county: Newaygo village..... (July 11-Aug. 10.)	1	0	Muskegon county: Carnovia township..... (Aug. 8-Oct. 20.)	6	1			
Ontonagon county: McMillan township..... (Aug.-Oct. 26.)	7	0	Kent county: Sparta township..... (Nov. 1-Dec. 15.)	1	0	Kent county: Tyrone township.. (Nov. 15-Jan. 25, 1902.)	2	0
Osceola county: Marion village..... (Jan.-Mar. 10.)	1	0	Marquette county: Michigamme twp..... (Aug. 8-Aug. 27.)	1	0			
Otsego county: Gaylord village..... (June 17-Jan. 1, 1902.)	5	0	Osceola county: Marion township..... (Feb.-Mar.)	1	0			
			Montmorency county: Briley township..... (Sept. 1. —.)	1	0			
			Otsego county: Corwith township..... (Dec. 1-Dec. 23.)	1	0			

* This foot-note is on the bottom of the first page of this table.

† Health officer of second locality did not state whether it was from village or township.

TABLE 5.—CONTINUED.—*Movement of infection of typhoid fever.*

First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Ottawa county: Wright township..... (Jan.-Apr. 6.)	2	1	Kent county: Rockford township.... (Oct. 17-Dec. 20.)	2	0			
Presque Isle county: Bearinger township....	*	.....	Presque Isle county: Case township..... (Oct. 12-Oct. 31.)	1	1			
Presque Isle county: Onaway township.....	*	.....	Cheboygan county: Waverly township..... (Sept. 11-Jan. 1, 1902.)	1	0			
			Clare county: Clare city..... (Sept. 1-Sept. 20.)	1	0			
			Ionia county: Ionia city..... (Jan. 17-Jan. 19.)	1	1			
Saginaw county: Saginaw City..... (Jan. 21-Dec. 31.)	87	15	Ontonagon county: McMillan township.... (July 9-Aug. 5.)	1	0			
			Tuscola county: Akron township..... (June 27-Aug. 1.)	2	1			
			Saginaw county: Buena Vista township. (June 1-June 18.)	1	0			
Sanilac county: Sanilac Center†.....	*	.....	Sanilac county: Custer township..... (Apr. 10-June 2.)	2	1			
Sanilac county: Speaker township..... (May 25-June 25.)	1	0	St. Clair county: Grant township..... (Apr. 8-May 1.)	1	0			
Shiawassee county: Rush township..... (Nov. 12-Feb. 25, 1902.)	2	0	Saginaw county: Chapin township..... (Dec. 5-Jan. 10, 1902.)	2	1			
St. Clair county: Marine City..... (Mar. 15-Nov. 9.)	11	8	Huron county: Huron township..... (Nov. 11-Nov. 20.)	1	0			
			Sanilac county: Lexington township... (July 5-Aug. 9.)	2	0			
St. Clair county: Port Huron city..... (Jan. 11-Jan. 13, 1902.)	68	7	St. Clair county: Columbus township... (— May 4.)	1	1			
			Wales township..... (Apr. 28-June 26.)	1	0			
St. Clair county: Port Huron township.. (Marysville.)	*	.....	Huron county: Grant township..... (July 4-Aug. 12.)	1	0			
St. Clair county: St. Clair city.....	*	.....	St. Clair county: Emmet township..... (Dec. 23-Feb. 19, 1902.)	1	0			
			Wales township..... (Jan. 20-Feb. 10.)	1	1			
Tuscola county: Gilford township..... (Aug. 10-Oct. 26.)	3	0	Tuscola county: Denmark township.... (Sept. 30-Oct. 15.)	1	0			

* This foot-note is on the bottom of the first page of this table.

† Health officer of first locality did not state whether it was from village or township.

154 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 5.—CONTINUED.—*Movement of infection of typhoid fever.*

First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Van Buren county: Bloomingdale village..	*	....	Allegan county: Lee township..... (Mar. 19-Apr. 6.)	1	0			
Van Buren county: Decatur village..... (— Sept. 25.)	1	1	Cass county: Marcellus village..... (Sept. 25-Oct. 22.)	1	0			
Van Buren county: Keeler township..... (Oct. 30-Dec. 31.)	1	0	Berrien county: Watervliet township.. (Sept. 20-Oct. 23.)	1	0			
Washtenaw county: Chelsea village.....	*	....	St. Joseph county: Colon township..... (Sept. 20-Nov. 10.)	1	0			
Washtenaw county: Milan + (village)..... (Jan.-Feb. 16.)	2	0	Branch county: Union City village..... (Jan. 23-Feb. 14.)	1	0			
Washtenaw county: Milan village.....	*	....	Monroe county: Milan township..... (Nov. 13-Dec. 22.)	1	0			
Wayne county: Delray village.....	1	0	Tuscola county: Arbela township..... (Oct. 15-Dec. 26.)	4	0			
			Wayne county: Springwells township. (Apr. 3-Apr. 23.)	1	0			
Wayne county.....	....	....	Oakland county: Novi township..... (Oct. 4-Nov. 10.)	1	0			
			Bay county: Merritt township..... (Aug. 3-Dec. 28.)	4	0			
			Macomb county: Warren township..... (Apr. 11 May 15.)	1	0			
			Oakland county: Royal Oak township... (Aug. 13 Oct. 21.)	2	1			
Wayne county: Detroit.....	52	52	Washtenaw county: Saline township..... (July 28-Sept. 3.)	1	0			
			Wayne county: Dearborn township.... (— May 14.)	1	1			
			Grosse Pointe village. (July-Sept. 20.)	2	0			
			Plymouth township.... (Sept. 15-Oct. 10.)	1	0			
			Springwells township. (Apr. 3-Apr. 23.)	1	0			
Wayne county: Trenton village..... (Sept. 6-Dec. 25.)	7	0	Wayne county: Taylor township..... Sept. 8-Oct. 9.)	1	0			

* This foot-note is on the bottom of the first page of this table.

+ Health officer of first locality did not state whether it was from village or township.

TABLE 5.—CONTINUED.—*Movement of infection of typhoid fever.*

First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Wayne county: Wyandotte city..... (May 15-May, 1902.)	20	7	Monroe county: Berlin township..... (Oct. 2-Nov. 2.)	2	0			
			Washtenaw county: Ypsilanti township.... (Nov. 18-Dec. 5.)	1	0			
			Wayne county: Huron township..... (Sept. 7-Dec. 6.)	4	0			
			Taylor township..... (Sept. 17-Oct. 9.)	5	0			
Wexford county: Cadillac city..... (June 1-Sept. 29.)	7	3	Missaukee county: Lake township..... (Mar. 3-May 31.)	2	0			
			Lake township..... (Sept. 1-Dec. 23.)	6	0			
			Lake township..... (Sept. 12-Nov. 30.)	1	0			
			Wexford county: Harrington township..... (July 12—.)	2	1			
Wexford county: Hanover township..... (Aug. 5-Aug. 21.)	1	1	Grand Traverse county: Grant township..... (Aug. 9-Aug. 25.)	1	0			
Wexford county: Harrietta township ...	*	....	Kent county: Sand Lake village..... (Feb. 10-Mar. 2.)	1	0			
Northern Michigan.....			Sanilac county: Wheatland township .	1	0	Sanilac county: Marion township†..	5	0
Upper Peninsula.....			Genesee county: Montrose township.... (Aug. 1-Aug. 25.)	1	0			
			Manistee county: Manistee city..... (Sept. 6-Jan. 15, 1902.)	6	0			
Southern Michigan.....			Antrim county: Central Lake township (Nov. 10-Dec. 2.)	1	0			
Movement of infection of typhoid fever into Michigan from outside the State.								
Canada.....			Cheboygan county: Inverness township... (Oct.-Nov. 3.)	2	0			
			Chippewa county: De Tour village..... (Sept. 20-Oct. 19.)	1	0			
Canada: Sarnia.....			Sanilac county: Crosswell village..... (Sept. 6—.)	3	0			
Dakota.....			Cass county: Howard township..... (June 1-July 25.)	2	0	Cass county: Cassopolis village† (July 15-Dec. 10.)	5	0

* This foot-note is on the bottom of the first page of this table.
† From Marion township, the contagion spread to Deckerville village, Sanilac county, resulting in one case.
‡ From Cassopolis village, Cass county, infection spread to Howard township, Cass county, resulting in four cases.

156 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 5.—CONTINUED.—*Movement of infection of typhoid fever into Michigan from outside the State.*

First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Florida.....			Allegan county: Saugatuck township.. (July 10-Sept. 18.)	1	0			
			Berrien county: Coloma village..... (Mar. 9-Apr. 22.)	1	0			
Illinois.....			Isabella county: Fremont township..... (July 29 Aug. 5.)	1	1			
			Berrien county: St. Joseph city..... (May 14-May 28.)	1	1			
			Lapeer county: Columbiaville village.. (June 12-July 5.)	1	0			
Illinois: Chicago.....			Shiawassee county: Antrim township..... (July 3-Aug. 31.)	1	0			
			Van Buren county: Columbia township.... (Sept. 14-Sept. 22.)	1	1			
			South Haven village.. (Oct. 8-Nov. 20.)	3	0			
Illinois: Chicago Heights.....			Jackson county: Leoni township..... (Nov. 7-Dec. 1.)	1	0			
Indiana.....			Missaukee county: Lake township..... (Sept. 10-Oct. 17.)	1	0			
Indiana: Elkhart.....			Hillsdale county: Hillsdale city..... (— Oct. 8.)	1	1			
Indiana: Matthews township.....			Hillsdale county: Fayette township..... (Aug. 8-Oct. 1.)	1	0			
Indiana: South Bend.....			Cass county: Ontwa township..... (Sept. 1 Dec. 8.)	2	0			
Iowa.....			Gratiot county: Ithaca village..... (Oct. 4-Nov. 12.)	2	0			
			Calhoun county: Homer township..... (Nov.-Nov.)	4	2			
Kentucky.....			Marshall city..... (Oct. 16-Nov. 16.)	1	0			
Louisiana.....			Eaton county: Grand Ledge city..... (June 1-July 10.)	1	0	Saginaw county: Brant township.... (July 22-Aug. 29.)	2	0
Missouri.....			Mackinac county: Mackinac Island city.. (Aug. 31-Oct. 19.)	3	0			
Montana.....			Mecosta county: Green township..... (Sept.-Sept. 16.)	2	2			

TABLE 5.—CONCLUDED.—*Movement of infection of typhoid fever into Michigan from outside the State.*

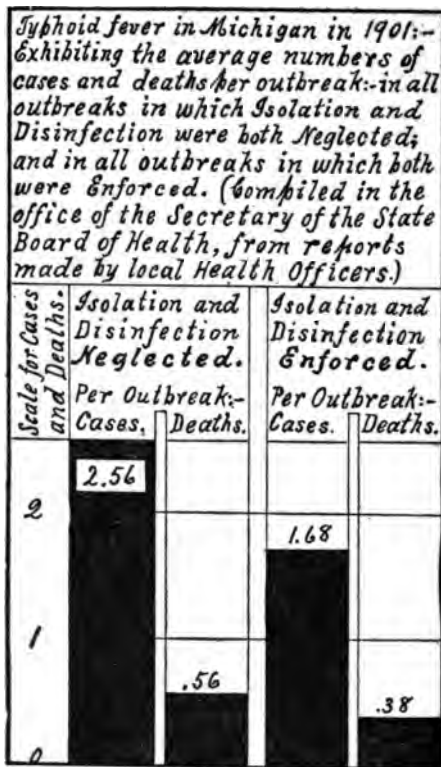
First localities from which typhoid fever was spread.			Second localities infected from first.			Third localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
New York: Buffalo			Hillsdale county: Hillsdale city..... (— Nov. 2.)	1	0			
			Lapeer county: North Branch village.. (Sept. 28-Nov. 1.)	1	0			
			Ontonagon county: Rockland township.... (Oct. 13-Nov. 1.)	1	0			
New York: New York city			Calhoun county: Marshall city..... (Oct. 18-Oct. 30.)	1	1			
Ohio			Kent county: Grand Rapids township (July 1-Aug. 8.)	1	0			
			Hillsdale county: Hillsdale city..... (Mar. 1-Dec. 10.)	13	1	Hillsdale county: Jonesville village.. (May —.)	2	1
Ohio: Toledo			Lenawee county: Dover township..... (Nov. 29-Dec. 20.)	1	1			
			Livingston county: Iosco township..... (Jan. 6-Jan. 25.)	1	1			
			Monroe county: Bedford township..... (June 29-Aug. 3.)	1	0			
			Barry county: Maple Grove township (Apr. 27-June 16.)	3	0			
Pennsylvania			Lenawee county: Blissfield township.... (Feb. 8-Feb. 24.)	1	1			
			Blissfield village..... (Dec. 14-June 11, 1902.)	1	0			
			Clinton village..... (Aug. 26-Sept. 15.)	1	0			
From the South			Shiawassee county: Durand village..... (Jan. 20-Feb. 28.)	2	0			
Southern States			Sanilac county: Marlette township.... (Aug. 24-Nov. 7.)	3	0			
Sweden			Ontonagon county: Rockland township.... (Sept. 15-Oct. 24.)	1	0			
Tennessee			Allegan county: Casco township..... (Apr. 6-May 14.)	1	0			
			Huron county: Harbor Beach village. (Sept. —.)	1	0			
Wisconsin			Midland county: Mt. Hayley township.. (Oct. 28-Nov. 24.)	1	0			
Wisconsin: Milwaukee			Manistee county: Manistee township.... (Oct. 1-Nov. 20.)	1	0			

TABLE 6.—TYPHOID FEVER IN MICHIGAN IN 1901.—Exhibiting the numbers and average numbers of cases and deaths per outbreak—(1) in all the 903 outbreaks reported; (2) in the 328 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 17 outbreaks in which disinfection was enforced and isolation was doubtful; (4) in the 33 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 127 outbreaks in which disinfection was enforced and isolation was neglected; (6) in the 25 outbreaks in which isolation was enforced and disinfection was neglected; (7) in the 145 outbreaks in which both isolation and disinfection were neglected; (8) in the 227 outbreaks in which both isolation and disinfection were enforced.

	(1) All outbreaks. (903 outbreaks.)*		(2) Isolation or disinfection or both not mentioned, or statements doubtful. (328 outbreaks.)		(3) Disinfection enforced—Isolation doubtful. (17 outbreaks.)		(4) Isolation enforced—Disinfection doubtful. (33 outbreaks.)		(5) Disinfection enforced—Isolation neglected. (127 outbreaks.)		(6) Isolation and disinfection neglected. (25 outbreaks.)		(7) Isolation and disinfection both neglected. (145 outbreaks.)		(8) Isolation and disinfection both enforced. (227 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals....	2,205	468	990	228	57	2	44	9	313	53	49	9	371	81	381	86
Averages	2.44	.52	3.02	.70	3.35	.12	1.33	.27	2.46	.42	1.96	.36	2.56	.56	1.66	.38

* These do not include the cases and deaths in Detroit, Grand Rapids, Kalamazoo, Bay City, Battle Creek, Jackson, Saginaw, Ishpeming, Menominee, Port Huron, Ann Arbor, and Calumet township, because of the difficulty in determining the beginning and ending of an outbreak in these localities, in which the disease was present in some part of the locality nearly all the time.

ISOLATION AND DISINFECTION RESTRICT TYPHOID FEVER.



This diagram graphically represents the lower line of figures in the last four columns of Table 6.

[PLATE 1149]

TABLE 7.—TYPHOID FEVER IN MICHIGAN.—Exhibiting for the year 1901, and for the eleven year period, 1890-1900, the numbers of reported outbreaks, cases and deaths in all outbreaks, and the numbers of outbreaks, cases and deaths for the same year and period of years, relative to which restrictive measures were neglected, and the numbers relative to which those measures were enforced; also the estimated number of cases and deaths prevented, in said year and period of years, by isolation and disinfection.

Years.	All outbreaks.			Isolation and disinfection both neglected.			Isolation and disinfection both enforced.			Cases and deaths indicated as having been prevented by isolation and disinfection.	
	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Cases.	Deaths.
1901.....	*903	2,205	468	145	371	81	227	381	86	107	38
Totals 1890-1900.....	7,196	29,166	5,018	1,154	6,916	1,014	914	1,847	311	17,187	1,640
Averages, eleven years, 1890-1900.....	654	2,651	456	105	639	92	83	168	28	1,542	149
Average cases and deaths per outbreak, 11 years, 1890-1900.....	.....	4.05	.70	.....	5.99	.88	.....	2.02	.....	.....	.....

* See footnote to Table 6.

TABLE 15.—Exhibiting the number of inches of earth above the ground water in Lansing, by months, for the year 1901, compared with the per cent of reported cases and outbreaks of typhoid fever in Michigan, for each month of 1901; also average per cents of the same for the 14 years, 1887-1900, and the total numbers of cases and outbreaks included in this table. (Compiled from those cases of which the date of occurrence was given; and for those outbreaks of which the time of beginning was stated.)

Specifications relative to ground water and typhoid fever.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	No. of cases and out-breaks included in this table.
Inches of earth above the water, year 1901.....	.....	319	324	318	319	317	315	314	316	314	314	317	315	.....
Per cent of cases of typhoid fever reported, year 1901.....	100	8	5	5	4	4	3	6	13	20	17	9	7	9,472
Per cent of outbreaks which began in each month, 1901.....	100	7	4	5	4	4	5	9	15	21	13	7	5	531
Inches of earth above the water, average 1887-1900.....	.....	308	308	305	304	302	300	302	303	305	308	309	309	.....
Per cent of cases of typhoid fever reported, average 1887-1900.....	100	4	3	3	3	3	4	6	13	21	21	14	8	31,387
Per cent of outbreaks which began in each month, av. 1887-1900.....	100	6	3	3	3	4	5	9	18	19	16	8	5	7,308

Probable movement of infection of typhoid fever.—In eighteen outbreaks with an aggregate of forty-four cases, including six deaths, the contagium was reported as probably traced to other outbreaks. One outbreak with two cases was reported as probably traced to an outbreak outside of the State.

In addition to the probable movement of contagium as given above, the movements of contagium of typhoid fever in Michigan are given in tabulated form in Table 5.

Measures taken to restrict typhoid fever results.—In studying the effects of efforts of health officers for the restriction and prevention of typhoid fever, and of the difficulties experienced by some of them in carrying out the methods recommended by the State Board of Health to that end, it is interesting to note the difference in the reported number of cases of sickness and of deaths from this disease, in outbreaks where local health officers were able to enforce isolation and disinfection, and in those outbreaks in which, for any reason, those restrictive measures were neglected.

By Table 6 it may be seen that in the outbreaks relative to which the reports state that isolation and disinfection were enforced, there occurred 1.68 cases, including .38 of one death per outbreak; whereas, in those outbreaks in which isolation and disinfection were neglected there were 2.56 cases, including .56 of one death per outbreak.

An examination of Table 6 shows that there were 328 outbreaks where isolation and disinfection were doubtful, and that the number of cases to the outbreak was greater than in those outbreaks where isolation and disinfection were enforced.

In the compilation of the reports for Tables 6 and 7 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and disinfection enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

That there is better effort made each year to restrict this disease, is shown by the fact that in about twenty-five per cent of the outbreaks during the year 1901, isolation and disinfection were enforced, in 1900 only sixteen per cent were enforced, and the average for the eleven years, 1890-1900 was about thirteen per cent.

Table 7 indicates that in 1901 there was a saving of 107 cases, including 38 lives, through isolation and disinfection.

In the eleven years, 1890-1900, in those outbreaks in which isolation and disinfection were neglected the average number of cases per outbreak was 5.99 and the average number of deaths .88 of one death; and in those outbreaks, in this period of years, in which restrictive measures were enforced, the average number of cases per outbreak was 2.02 and the average number of deaths per outbreak was .34 of one death.

Average duration of typhoid fever.—Fatal and non-fatal cases.—The average duration of fatal cases of typhoid fever in 1901 was 20.1 days for males and 19.1 days for females.

TABLE 8.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from typhoid fever in Michigan, during the year 1901, and averages for the 14 years, 1887-1900. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of typhoid fever.															
Year.	Sex.	No. of cases included.	Average du- ration.	Duration of sickness:—Per cent of deaths in each period of days.											
				All cases	Un- der 11 days.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over
1901.	Males....	254	20.1	100	22	22	16	15	9	2	4	4	3	0	2
	Females..	145	19.1	100	28	20	14	11	13	6	3	1	3	1	1
	Males....	118	.....	100	21	16	17	16	10	6	4	3	3	1	4
	Females..	88	... ..	100	24	22	15	12	10	6	4	4	1	2	3
A. V. 1887-1900.															

TABLE 9.—*Exhibiting, by sex of patient, by per cent of cases which recovered in specified periods of time, the duration (in days) of non-fatal cases of sickness from typhoid fever, in Michigan, during the year 1901, and the averages for the 14 years, 1887-1900. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-fatal cases of typhoid fever.															
Year.	Sex.	No. of cases included.	Average duration.	Duration of sickness:—Per cent of cases in each period of days.											
				All periods.	Under 11 days.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over.
1901.	Males.....	671	33.4	100	3	6	9	14	20	13	9	7	4	4	10
	Females..	489	31.2	100	3	6	11	14	26	12	9	5	4	3	7
	Males....	452	.....	100	2	6	8	15	18	14	11	9	6	3	9
	Females..	341	.....	100	2	6	9	17	16	14	12	7	4	4	9
A. V. 1887-1900.															

Of the 1,646 males and 1,225 females who were reported to have died from typhoid fever within the fourteen years, 1887-1900, and of which the interval between the day of being taken sick and the day of death was

given, 21 per cent of males and 24 per cent of females died before the eleventh day of sickness; 16 per cent of males and 22 per cent of females died after ten to fifteen days of sickness. Seventy per cent of males and 73 per cent of females died before the twenty-sixth day of sickness.

In Table 9 it may be noticed that in *non-fatal* cases of typhoid fever for the fourteen years 1887-1900, 63 per cent of the males and 64 per cent of the females recovered before the thirty-sixth day of sickness. The average duration of non-fatal cases in 1901 was, in males 33.4 days, and in females 31.2 days.

The average duration of cases of typhoid fever in 1901, fatal and non-fatal, was 29.8 days for males, 28.4 days for females, and 29.2 days for both sexes.

Age of occurrence of typhoid fever.—Table 10 shows that of the 1,319 males and 944 females who were sick with typhoid fever in 1901, and of whom the ages were reported, the greatest per cent of males were of ages between twenty and twenty-four years; and of females (in any five year period) was between fifteen and nineteen years.

TABLE 10.—*Exhibiting, by sex, the per cent of persons in certain age-groups sick from typhoid fever in Michigan, during the year 1901, and the average for the 14 years 1887-1900; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of person sick, years.	No. of cases included.	Age.—In periods of years.—Per cent of cases in each period of age.										
				All ages.	Under 10 years	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1901.	Males.....	25	1,319	100	12	10	15	18	14	10	8	5	3	5
	Females.....	23	944	100	17	14	17	14	12	7	6	5	3	7
Av. 1887-1900.	Males.....	23	837	100	15	12	15	20	21	8	6	4	3	4
	Females.....	22	634	100	18	17	19	14	9	7	5	4	3	5

TABLE 11.—*Exhibiting, by sex, the per cent of persons in certain age-groups who died of typhoid fever during the year 1901; also for the years 1892-1900, the per cent the deaths in each group were of all the deaths from typhoid fever.*

Year.	Sex.	Average age of decedents, years.	No. of deaths included.	Per cent of deaths in certain age-groups.*										
				All ages.	Under 10 years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1901.	Males.....	30	394	100	6	9	10	17	14	12	12	4	5	11
	Females..	29	247	100	10	8	16	15	14	5	8	6	6	13
1892-1900.	Percent the deaths in each age-group were of all the deaths.	.....	3,433	100	9	11	15	17	12	9	7	5	4	10

* In each age-group both years are included.

Table 11 shows that of the 394 males and 247 females who died of typhoid fever in 1901, and of whom the ages were reported, the greatest per cent of males were aged from twenty to twenty-four years; and the greatest per cent of females were between fifteen and nineteen years old; and that 56 per cent of the males and 63 per cent of the females were under thirty years of age.

Table 11 shows also that the greatest per cent of decedents of both sexes in the nine years 1892-1900 died at ages between twenty and twenty-four years.

In studying Tables 10 and 11, and first two lines in Table 12, relative to age of persons who died with or who had typhoid fever, it should be held in mind that there are more persons living in the earlier ages than at the more advanced ages. In the last three lines of Table 12, this fact is taken account of, and they exhibit the relative danger of death at each period of life, according to the experience in Michigan in the nine years 1892-1900.

By Table 12 it may be seen, that to males the greatest danger of death from typhoid fever was in the age-periods fifteen to thirty-nine years, especially in the period twenty to twenty-four years; the greatest death-rate of females was during the age-period fifteen to twenty-five years.

TABLE 12.—*Exhibiting, by sex, the number of persons in certain age-groups who died of typhoid fever during the year 1901; also by age-groups, the number of deaths in the nine years, 1892-1900, per 10,000 inhabitants.*

Year.	Sex.	Average age of decedents, years.	No. of deaths included.	Number of deaths in certain age-groups.*									
				Under 10 years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1901.	Males....	30	394	23	37	40	66	55	46	47	17	19	44
	Females..	29	247	24	20	40	36	34	13	20	14	14	32
1892-1900.	Males....	{Deaths per 10,000 inhabitants of the same sex and age, in each age-group.}		.68	1.48	2.50	4.08	3.45	2.54	2.07	1.48	1.71	1.15
	Females..			.68	1.95	2.51	2.15	1.46	1.55	1.37	1.19	1.16	1.03
1892-1900.	The average number of deaths (both sexes) per 10,000 inhabitants in each age-group for the nine years, 1892-1900.....			.68	1.71	2.51	3.12	2.47	2.07	1.74	1.35	1.46	1.09

* In each age-group both years are included.

Two lines of evidence of the prevalence of typhoid fever.—In studying the prevalence of typhoid fever in 1901, from the facts presented in the preceding and following pages, it must be borne in mind that those facts are derived from two distinct sources of information:

1.—The numbers of outbreaks, of cases of sickness, and of deaths from typhoid fever are taken from special reports from health officers, during the course of an outbreak, at its close, or in annual reports at the close of the year. If all the people and officers reported as the law provides, the facts presented would represent the *actual numbers* of outbreaks, cases of sickness, and deaths from typhoid fever which occurred

164 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

in the State during the year; but *all* do not so report. It is just, however, to state that as the people generally are becoming better instructed in the measures recommended by the State Board of Health for the saving of life and health, better and more complete reports are made year by year. So, each year, we believe that an increasing proportion of the cases of sickness and deaths from the dangerous communicable diseases are reported to this office. This tends toward an apparent increase in the prevalence of the disease each year, modified, of course, by the real fluctuation in prevalence. While waiting for perfect reports, the facts derived from those now received are valuable for purposes of study.

TABLE 13.—*For the year 1901, and an average for the 15 years, 1886-1900, the per cent of reports (from regular correspondents to the State Board of Health, and others) stating the presence of typhoid fever in Michigan; also, for the same year and period of years, the average number of outbreaks, number of localities of outbreaks, the cases of sickness and the deaths reported from typhoid fever.*

Years.	Per cent of weekly postal reports stating the presence of typhoid fever.	Reported outbreaks of typhoid fever.	Reported localities of outbreaks of typhoid fever.	Reported cases of sickness from typhoid fever.	Reported deaths from typhoid fever.
1901.....	13	978	725	3,002	665
Average 15 years, 1886-1900.....	10	581	502	2,834	508

2.—The prevalence of typhoid fever, or any given disease, as indicated by the “per cent of reports” is taken from the weekly postal-card reports from regular correspondents of the State Board, health officers of cities and villages, and others. The “per cent of reports” is the per cent of the whole number of reports received which stated the presence of the disease named; it gives the relative prevalence of the disease, under the observation of the physicians who report. It may represent the relative area of prevalence of the disease, combined with the relative number of weeks the disease continued where it did occur, *but not the number of cases.*

The weekly card-reports, however, furnish a valuable means of ascertaining, approximately, the relative prevalence of the several diseases in a given year, and the relative prevalence of a given disease in one year

TABLE 14.—HEIGHT OF GROUND WATER.—*Inches of earth above the water—by months for the year 1901; also averages for the 15 years, 1886-1900, at Lansing, Mich.,—well in the Capitol grounds.*

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901..	317	319	324	318	319	317	315	314	316	314	314	317	315
Average 15 years, 1886-1900.....	304	305	306	303	301	300	299	300	302	304	307	308	308

TABLE 15 is on page 159.

compared with other years, and it is as good a scheme for ascertaining the facts as is yet available. Therefore the sickness statistics, based upon those weekly card-reports, should be relied upon for a comparison of the relative prevalence of typhoid fever in 1901, compared with preceding years. However, the evidence from the two sources may well be compared.

A comparison of the evidence from the two sources just mentioned, relative to typhoid fever during the years, 1886-1900, is facilitated by Table 13.

TABLE 16.—TYPHOID FEVER IN MICHIGAN.—Average per cent of weekly card-reports stating the presence of typhoid fever, by months, for 10 years, 1878-87, and in the year 1901; also the average for the 15 years, 1886-1900.

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 yrs., 1878-87	10	6	5	4	3	3	5	7	14	18	21	16	10
1901.....	13	20	10	9	10	5	4	7	19	23	23	14	11
Av. 15 yrs., 1886-1900.....	10	6	5	4	4	3	5	7	14	19	21	17	11

TABLE 17.—RAINFALL IN MICHIGAN.—Average number of inches, by months, for the 10 years, 1878-87, and the year 1901; also averages for the 15 years, 1886-1900.

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 yrs., 1878-87	37.27	2.09	2.89	2.28	2.49	3.52	4.24	3.44	3.21	3.72	3.45	2.98	2.69
1901.....	29.11	1.69	1.31	2.69	1.65	2.68	2.44	4.30	2.75	2.40	3.19	1.47	2.53
Av. 15 yrs., 1886-1900.....	31.23	2.39	2.14	2.11	2.29	3.49	3.04	2.52	2.64	3.85	2.57	2.90	2.29

TABLE 18.—TEMPERATURE OF THE WATER in the well at the State Capitol in Lansing, Mich., by months for the year 1901; also averages for the 15 years, 1886-1900.

Year and period of years.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901.....	51	52	*	50	50	51	51	51	52	52	53	50	52
Av. 15 yrs., 1886-1900.....	47	44	42	48	45	46	46	46	47	49	41	42	44

* In February there was no water in the well.

166 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 19.—*Sickness from typhoid fever in Michigan (as indicated by the weekly card-reports by all observers) and the depth of earth (in inches) above the water in the well, and the temperature of the water in the well at Lansing, Michigan, averages by year and months for the 15 years, 1886-1900.*

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Sickness from typhoid fever*.	10	6	5	4	4	3	5	7	14	19	21	17	11
Inches of earth above water in well †.....	304	305	306	303	301	300	299	300	302	304	307	308	308
Temperature of water in well ‡.	47	44	42	48	45	46	46	46	47	49	41	42	44

* Per cent of all reports received (from observers in different parts of the State) which stated the presence of typhoid fever, from last line in Table 16.

† This line is copied from the last line in Table 14.

‡ This line is copied from the last line in Table 18.

TABLE 20.—*Exhibiting the average total annual rainfall at stations in Michigan, the same for Lansing, the inches of earth above the ground water at Lansing, the inches of water in an undisturbed well at Lansing, and the reported sickness, from typhoid fever in Michigan, as indicated by the per cent of all the weekly card-reports which stated the presence of typhoid fever, during the year, 1901, and averages for the 15 years, 1886-1900.*

Year, and period of years.	Average total annual rainfall at stations in Michigan, in inches.	Total annual rainfall at Lansing, in inches.	Inches of earth above the ground water at Lansing.	Inches of water in an unused well at Lansing.	Ground water higher (+) or lower (—) than the 15 years average, in inches.	Average per cent of all weekly card-reports stating the presence of typhoid fever.	More (+) or less (—) sickness from typhoid fever than the 15 years average.
1901.....	29.11	35.17	317	7	—14	13	+3
Av. 15 yrs., 1886-1900	30.83	30.16	304	21	.....	10	.....

SCARLET FEVER IN MICHIGAN.—YEAR ENDING DECEMBER 31, 1901.

During the year ending December 31, 1901, there were reported to the Secretary of the State Board of Health 1,001 outbreaks of scarlet fever in 754 localities in Michigan, which resulted in 7,726 cases,* including 298 deaths.

The average numbers of cases of sickness and of deaths per outbreak, in 1901, were 7.72 cases, including .30 deaths. The fatality, i. e., the proportion of reported cases which proved fatal, was 3.9 per 100 cases.

Scarlet fever in 1901, compared with previous years.—From year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by local health authorities throughout the State to furnish in their reports the information desired by the State Board. These facts, together with the constantly increasing population, make it difficult to determine the exact increase or decrease of prevalence of the disease in the State by comparison of the numbers of outbreaks of the disease, and the cases and deaths resulting therefrom, and this should be borne in mind in studying Table 1. It might reasonably be expected that these facts will produce a constant increase in the reported prevalence of the disease.

TABLE 1.—SCARLET FEVER IN MICHIGAN.—*Numbers of reported outbreaks, localities (in which they occurred), cases and deaths; average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal, as reported for the years 1900 and 1901, with the departures of the same for 1901 from 1900 and from the averages of the same for the 17 years, 1884-1900.*

Year.	Reported outbreaks.	Reported localities.	Reported cases.*	Av. No. of cases per outbreak.	Reported deaths.	Av. No. of deaths per outbreak.	Deaths per 100 cases.
1900.....	850	647	6,734	7.92	306	.36	4.5
1901.....	1,001	754	7,726	7.72	298	.30	3.9
Departures of 1901 from 1900.....	+151	+107	+992	— .20	— 8	— .06	— .6
Av. for seventeen years, 1884-1900... Departures of 1901 from the averages for 17 years, 1884-1900.....	503 +498	418 +336	4,083 +3,643	8.12 — .40	225 +73	.45 — .15	5.5 — 1.6

In 1901 there were 992 cases more and eight deaths less than in 1900.

While the number of outbreaks in 1901 was almost double the average number for the seventeen years, 1884-1900, the average numbers of cases and deaths *per outbreak* were slightly less.

* Throughout this article, "cases" include deaths, unless the word non-fatal is used.

Table 1 and comments thereon are based upon reports to the office of the State Board of Health. Table 2, Diagram 1, and comments thereon are based upon returns of deaths, made to the Secretary of State. For all years preceding 1898 the statistics of deaths were collected after the close of the year in which they occurred; for all years after 1897 the deaths were recorded before burial, and returns were made to the Secretary of State early in the following month. There is reason to believe that under the new law nearly all deaths are included in the statistics, whereas, before 1898 a considerable proportion was omitted. This fact should be held in mind in comparing the deaths reported for the year 1901 with those reported in years previous to 1898. The final compilation of deaths from scarlet fever has not been made by the Division of Vital Statistics, in the State Department, consequently the death-rate computed for 1901 (11.8) may not be quite accurate; because where two diseases are mentioned as causing a death, as not infrequently occurs, not always the same one is used in the final compilation as in the Bulletin of Vital Statistics.

TABLE 2.—*Exhibiting the reported number of deaths from scarlet fever in Michigan per 100,000 population for each of the 34 years, 1868-1901. (The data for this table were supplied by C. L. Wilbur, M. D., Chief of Vital Statistics of Michigan, Department of the Secretary of State.)*

Year.		1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	
Death rate...		8.48	22.09	71.96	56.62	44.33	43.94	32.23	29.99	27.41	26.91	27.74	26.26	22.66	22.82	
Year.		1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Death rate.	{	34.25	37.94	17.91	13.13	16.69	16.25	16.13	11.72	10.60	18.70	20.23	16.30	7.27	5.09	4.58
Year.		1897.	1898.	1899.	1900.	1901.										
Death rate.	{	4.0	3.9	6.0	11.2	11.8										

Sickness-rates, by counties, from reported scarlet fever.—Table 3 shows that the greatest sickness-rate from reported scarlet fever, by months, was in Crawford county, where the ratio of cases to population was 275.08 to 10,000. This rate was over eight times the average rate for the State, and more than double the rate for Grand Traverse county, which had the next highest sickness-rate, 123.97 cases per 10,000 population. Crawford county also had the highest sickness-rate in 1900. Marquette, with 118.25 cases per 10,000 population, and Manistee, with 106.95 cases per 10,000 population, were next in order of high sickness-rates.

Sickness from scarlet fever was reported from all but two counties—Oscoda and Roscommon. Oscoda county had the highest sickness-rate for the year 1898, and a high rate for 1899 and 1900.

While there has been a steady improvement in reporting cases of scarlet fever, it is probable that there are cases of light forms of the disease, requiring no physician, that are not reported. Consequently the reports of cases of scarlet fever are not as complete as the reports of deaths from this disease, yet comparisons may be made, subject to the mental reser-

vation that not all cases are reported, and that the omissions may be greater in some parts of the State than in others.

Death-rates, by counties, from reported scarlet fever.—Table 3 shows that the greatest death-rate from reported scarlet fever, 15.22 deaths per 10,000 population, was in Keweenaw county. With the exception of Gogebic county, with 7.57 deaths, and Schoolcraft county, with 6.24 deaths per 10,000 population, this rate was more than three times the death-rate for any other county and over twelve times the average death-rate for the State. Keweenaw county had about the same death-rate (15.54) in 1900.

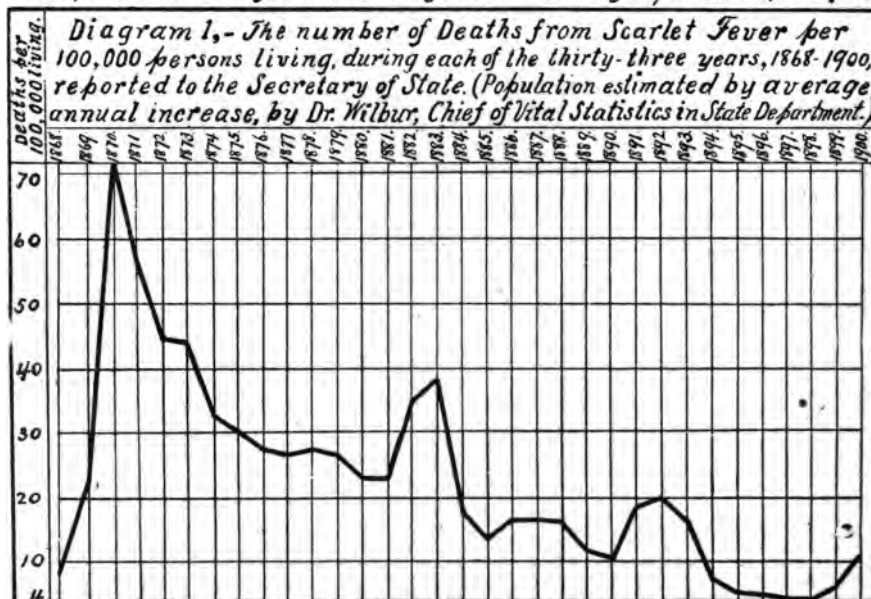
The death-rates are now believed to be fairly accurate.

From twenty-three counties, from which an aggregate of 814 cases of scarlet fever were reported, there were no deaths reported from this disease. The lowest death-rates, in counties from which deaths from this disease were reported, were in Ingham and Ottawa counties. These counties each had .25 of one death per 10,000 population.

Fatality, by counties, from reported scarlet fever.—The fatality from reported scarlet fever in 1901 was, for the whole State, 3.9 per cent, or about one death to twenty-six cases. In Alpena county one of the two cases reported proved fatal. In Iron county, two of the five reported cases (forty per cent) were fatal cases. The lowest fatality in counties from which deaths from scarlet fever were reported, one death per 127 cases, occurred in Ottawa county.

Distribution of scarlet fever in cities, villages and townships.—From the data in Table 4 it may be observed that 87 per cent of the cities, 47 per cent of the villages, and 45 per cent of the townships, were infected with scarlet fever. But the average population of the cities is over thir-

Reported Deaths from Scarlet fever in Michigan, 33 Years, 1868-1900.



[PLATE III.]

170 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

teen times the average population of the villages.* The highest case-rate (35.85) and death-rate (1.30) occurred in the cities and the highest fatality occurred in the townships.

TABLE 3.—Numbers of cases and deaths reported from scarlet fever, and the cases and deaths per 10,000 persons living in each county in Michigan during the year 1901. (Compiled from reports of health officers.)

State and counties.	Estimated population of Michigan for 1901.†	Number of reported		Number per 10,000 population, of		Counties.	Estimated population of Michigan for 1901.†	Number of reported		Number per 10,000 population, of	
		Cases.‡	Deaths.	Cases.‡	Deaths.			Cases.‡	Deaths.	Cases.‡	Deaths.
State.....	2,450,872	7,726	298	31.52	1.22	Keweenaw ..	3,285	18	5	54.79	15.22
						Lake.....	4,799	21	0	43.76	0
Alcona.....	5,736	36	0	62.76	0	Lapeer.....	27,434	79	1	28.80	.36
Alger.....	6,613	2	0	3.02	0	Leelanau....	10,719	4	0	3.73	0
Allegan.....	38,748	90	1	23.23	.26	Lenawee....	48,382	121	3	25.01	.62
Alpena.....	18,343	2	1	1.09	.55	Livingston...	19,534	60	0	30.72	0
Antrim.....	17,256	44	2	25.50	1.16	Luce.....	3,088	2	0	6.48	0
Arenac.....	10,300	47	4	45.63	3.88	Mackinac....	7,780	63	1	80.98	1.29
Baraga.....	4,335	16	0	36.91	0	Macomb.....	33,386	135	9	40.44	2.70
Barry.....	22,315	22	2	9.86	.85	Manistee....	28,145	301	7	106.95	2.49
Bay.....	62,556	409	12	65.38	1.92	Marquette...	41,776	494	7	118.25	1.68
Benzie.....	9,953	202	5	20.30	5.02	Mason.....	18,961	38	1	20.04	.53
Berrien.....	49,752	126	5	25.33	1.00	Mecosta.....	20,687	32	0	15.47	0
Branch.....	28,077	41	0	14.60	0	Menominee...	27,595	39	3	14.13	1.09
Calhoun.....	49,621	78	0	15.72	0	Midland.....	14,642	51	1	34.83	.68
Cass.....	20,826	64	0	30.73	0	Missaukee....	9,668	14	0	14.44	0
Charlevoix...	14,337	24	2	16.74	1.39	Monroe.....	32,682	77	3	23.56	.92
Cheboygan...	15,875	49	6	30.87	3.78	Montcalm....	32,519	95	3	29.21	.92
Chippewa...	22,338	44	7	19.70	3.13	Montmorency	3,356	1	0	2.97	0
Clare.....	8,423	6	0	7.12	0	Muskegon....	36,988	36	0	9.73	0
Clinton.....	24,917	70	4	28.05	1.60	Newaygo....	17,430	17	1	9.75	.57
Crawford....	2,981	81	4	275.08	1.34	Oakland.....	45,144	99	2	21.93	.44
Delta.....	24,649	104	1	42.19	.41	Oceana.....	16,651	31	0	18.62	0
Dickinson...	18,421	22	1	11.94	.54	Ogemaw.....	8,119	16	0	19.71	0
Eaton.....	31,509	155	0	49.19	0	Ontonagon...	6,083	43	2	70.69	3.29
Emmet.....	16,854	17	0	10.09	0	Osceola.....	18,089	12	0	6.63	0
Genesee.....	42,012	107	4	25.47	.95	Oscoda.....	1,412	0	0	0	0
Gladwin.....	6,840	19	2	27.78	2.92	Otsego.....	6,404	16	1	24.98	1.56
Gogebic.....	17,180	151	13	87.89	7.57	Ottawa.....	39,763	127	1	31.94	.25
G'd Traverse.	20,972	260	10	123.97	4.77	Presque Isle.	9,304	12	1	12.90	1.07
Gratiot.....	30,074	81	4	26.93	1.33	Rosecommon..	1,808	0	0	0	0
Hillsdale...	29,796	79	1	26.51	.34	Saginaw.....	81,117	173	6	21.33	.74
Houghton...	69,708	214	15	30.70	2.15	Sanilac.....	35,239	78	5	22.13	1.42
Huron.....	34,479	93	11	27.26	3.19	Schoolcraft..	8,015	39	5	48.66	6.24
Ingham.....	39,839	80	1	20.09	.25	Shiawassee...	34,034	88	2	25.86	.59
Ionia.....	34,246	63	3	18.40	.88	St. Clair.....	55,378	74	4	13.36	.72
Iosco.....	9,895	25	4	25.27	4.04	St. Joseph...	23,688	44	0	18.57	0
Iron.....	9,605	5	2	5.21	2.08	Tuscola.....	36,135	2.59	17	71.68	4.70
Isabella.....	23,007	31	2	13.47	.87	Van Buren...	33,641	81	0	24.08	0
Jackson.....	48,502	45	0	9.28	0	Washtenaw...	48,469	187	7	38.58	1.44
Kalamazoo...	44,685	288	5	64.45	1.12	Wayne.....	358,179	974	54	27.19	1.51
Kalkaska....	7,381	23	1	31.16	1.35	Wexford.....	17,310	43	2	24.84	1.16
Kent.....	131,008	317	9	24.20	.69						

* The average population of the cities is 12,148, of the villages, 910, and of the townships, 1,003.

† Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

‡ Include deaths from scarlet fever.

TABLE 4.—*Exhibiting the numbers of outbreaks and cases of and of deaths from scarlet fever which occurred in the cities, villages and townships of Michigan in 1901, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages, and townships. (Compiled from the reports of local health officials to the Secretary of the State Board of Health.)*

Classes of political divisions.	Estimated population.*	Health jurisdictions.	Outbreaks in :			Cases.†	Deaths.	Fatality. (Per cent cases of deaths.)	Rates per 10,000 population			
			Localities.		No. of.				Cases.†	Deaths.	Cases.†	Deaths.
			No. of.	Per cent of all localities.								
State (83 counties).....	2,450,872	1,595	754	47	1,001	7,726	298	3.9	31.52	1.22		
Cities.....	959,711	79	69	87	96	3,441	125	3.6	35.85	1.30		
Villages.....	282,146	310	146	47	175	913	28	3.1	32.36	.99		
Townships.....	1,209,015	1,206	539	45	730	3,372	145	4.3	27.89	1.20		

* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

† Includes deaths.

Scarlet fever in each month of the year 1901.—The last line of figures in Table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. (Thirty-seven of the outbreaks reported as having ended in January, and four of the outbreaks reported as having ended in February, also one each in March and April, were outbreaks which began the preceding year, and in which there were no new cases reported in 1901.) In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were fifty-three more beginnings than endings of outbreaks reported during the year 1901.

TABLE 5.—*Exhibiting the reported number of outbreaks of scarlet fever which began, the number which ended, and the number which were present, in each month of the year 1901, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Number began....	110	89	72	65	58	43	45	45	77	92	96	90	882
Number ended....	79	68	88	80	70	65	38	42	40	59	78	122	829
Number present...	249	254	254	228	203	171	142	144	178	229	259	267	.....

172 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

The second line of figures in Table 6 shows the per cent the localities infected in each month are of the exact number of localities (754) reported to this office for the year 1901.

The third line of figures in Table 6 shows the number of cases reported sick in any part of each month.

As some of the cases were sick longer than one month they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1901.

The fourth and last lines of figures in Table 6 show the per cent the cases present and the per cent the cases taken sick, in each month, are of the exact number of cases (7,726) reported to this office for the year 1901.

TABLE 6.—*Exhibiting the number and per cent of localities infected with scarlet fever, and the number and per cent of cases of scarlet fever present, and the number and per cent of cases taken sick, in Michigan, in each month during the year 1901.*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Localities, number.....	246	251	252	226	201	169	142	141	175	226	256	262
Per cent.....	32.6	33.3	33.4	30.0	26.7	22.4	18.8	18.7	23.2	29.9	34.0	34.7
Cases present, number....	759	1,063	1,053	856	737	561	469	570	1,152	928	1,011	1,184
Per cent.....	9.8	13.8	13.6	11.1	9.5	7.3	6.1	7.4	14.9	12.0	13.1	15.3
Cases taken sick.....	691	694	652	502	442	333	280	381	529	636	685	774
Per cent.....	8.9	9.0	8.4	6.5	5.7	4.3	3.6	4.9	6.8	8.2	8.9	10.0

Source of contagium of scarlet fever, how the disease is spread, and the vitality of the contagium.—Of the 7,726 cases of scarlet fever reported during the year 1901, the local health officers reported the source of contagium, as follows: Traced to a former case, 1,233; probably traced to a former case, 4; attributed to infected houses, articles, clothing, etc., 15; source of contagium unknown, 4,788; source of contagium not stated, 1,491; traced to an outside jurisdiction, 157; probably from an outside jurisdiction, 38.

The germ of scarlet fever is not yet demonstrated; at least its demonstration is not yet generally acknowledged by bacteriologists; but that there is a germ seems to be proved by the known communicability of the disease.

Reports of health officers and physicians indicate that the scarlet fever germ frequently retains its vitality for a long time outside of the human body, in an apparently dormant or inactive state, in houses, clothing, carpets, furniture, etc., and is then capable of developing scarlet fever in persons coming into such houses or in contact with or near such articles, thus showing the importance of carefully disinfecting all infected houses and articles, even where they are not to be used for a long time.

The following quotations are from a few of such reports sent to this office:—

"Housewife took in washing of nurse from hospital."—*M. A. Powell, Monterey township, Allegan county.*

"Thought to be by a letter received from Beaverton, Gladwin county, where they had scarlet fever."—*D. B. Kilpatrick, M. D., Woodland township, Barry county.*

"From playthings of a child who had been sick a year before."—*H. G. McIntosh, Butler township, Branch county.*

"Supposed to have come from repairing an old house, where some twenty years ago they had scarlet fever."—*Harley N. Baker, M. D., Spring Lake village, Ottawa county.*

"From a house where they had scarlet fever a year ago, by wrapping a baby in some clothing out of that house."—*Chas. W. Bahel, Onaway village, Presque Isle county.*

"From infected clothing brought from Patterson, New Jersey."—*W. G. Wight, M. D., Yale village, St. Clair county.*

"Patient, a professional nurse, prepared a room for a surgical operation where scarlet fever had existed a short time previously."—*B. M. Porter, M. D., Nottawa township, St. Joseph county.*

Outbreaks of scarlet fever reported traced to previous outbreaks.—According to reports of local health officers in Michigan the contagium of scarlet fever was permitted to spread from 123 outbreaks, having an aggregate of 2,933 cases, including 135 deaths, to other localities, resulting in 162 outbreaks, with an aggregate of 866 cases, including twenty deaths; from some of these second localities the contagium further spread to third localities, resulting in twenty-four outbreaks, with 128 cases, including four deaths; from thence the contagium spread to fourth localities, resulting in five outbreaks with sixty-five cases, including two deaths; and from one of these fourth localities the contagium spread to a fifth locality resulting in one outbreak with ten cases, including one death.

Fifteen outbreaks with an aggregate of forty-two cases were reported as having been traced to localities outside of Michigan; and from one of these outbreaks the contagium spread to two localities resulting in two outbreaks with six cases.

A total of 209 outbreaks with an aggregate of 1,117 cases, including twenty-seven deaths, reported as actually traced to previous outbreaks.

In forty-two outbreaks, with an aggregate of 314 cases, including nineteen deaths, previous outbreaks were given as the probable source of contagium; and one locality outside of Michigan was given as the probable source of contagium of one outbreak with one case.

Estimated number of cases of scarlet fever prevented, and number of lives saved, by isolation and disinfection.—Tables 7 and 8 and the accompanying diagram compare the average numbers of cases and deaths in outbreaks of scarlet fever where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where those measures were neglected.* By Table 8 it may be seen that during the fifteen years, 1887-1901, there were five times as many cases and deaths in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By Table 7 it may be seen that during the year 1901 there were reported to the office of the State Board of Health 917 outbreaks of scarlet fever,

*In the compilation of the reports for Tables 7 and 8 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate and disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and disinfection enforced." If, however, he neglects to properly isolate and disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

with 4,771 cases, including 177 deaths.* Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and disinfection both neglected," there would have occurred 8,748 cases, including 403 deaths, and taking from these respectively the cases (4,771) including deaths (177), which did occur, leaves 3,977 cases, including 226 deaths, indicated as prevented in these 917 outbreaks, by isolation and disinfection. By the same method for each year the indicated saving in the 8,074 outbreaks which occurred during the fifteen years, 1887-1901, is 44,952 cases, including 1,736 lives. This is shown in Table 8.

Period of incubation, in scarlet fever.—The average period of incubation in the 212 reported instances is nine days; the greatest number of instances given in any single period was in the seven-day period.

Ages of greatest prevalence of, and mortality from, scarlet fever.—Of the total numbers of cases, including deaths, reported to this office for the year 1901, the number of deaths per 100 cases was 3.9; and in the smaller numbers of cases, including deaths, of which the ages were stated, the number of deaths per 100 cases was 4.6; of the 7,726 cases of scarlet fever reported, of which 298 were fatal cases, the ages were stated for 5,479 cases, 254 of these being fatal cases.

Table 10 shows that, except in cases over sixty years of age, the greatest fatality was in children under one year of age, the fatality decreasing each succeeding year and periods of years, up to fifteen years of age. In children under five years of age the number of deaths per 100 cases was 11.1. This fatality was more than double that of any other five year age-group up to thirty years. The fatality increased from thirty to forty years. The number of deaths in persons over sixty years old was 33.3 per 100 cases.

Table 11 shows that the greatest per cent of all cases, fatal and non-fatal, of scarlet fever occurred in children from five to nine years old, and the greatest per cent of all deaths was in children under five years of age, both for the year 1901 and for the nine years, 1892-1900.

Table 12 shows that, by sex, the deaths were proportioned about the same,—the greatest per cent, both of males and females, having occurred in children under five years of age for the year 1901 and for the eight years, 1893-1900.

The average age of decedents for the year 1901 was 5.8 years for both sexes, and for the period of years, 1893-1900, the average age was 5.3 years for males and 6.2 for females. The average age of cases recovering from this disease for the year 1901 was 8.5 years for males and nine years for females, and for the period of years, 1893-1900, the average age was 7.9 for males and 8.9 for females.

* *Definition of outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of years require that outbreaks be counted as closed, at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

TABLE 7.—SCARLET FEVER IN MICHIGAN IN 1901. Exhibiting the average numbers of cases and deaths per outbreak:—(1) in all the 917 outbreaks reported; (2) in the 327 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 23 outbreaks in which disinfection was enforced and isolation doubtful; (4) in the 58 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 71 outbreaks in which disinfection was enforced and isolation neglected; (6) in the 48 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 162 outbreaks in which isolation and disinfection were both neglected; (8) in the 228 outbreaks in which isolation and disinfection were both enforced.

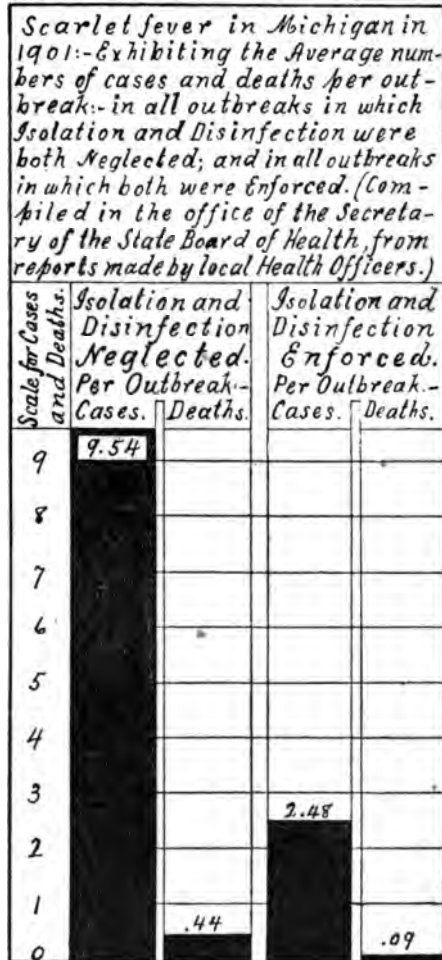
(1) All outbreaks. (917 outbreaks)*	(2) Isolation or disinfection or both not mentioned or statements doubtful. (327 outbreaks.)		(3) Disinfection enforced—Isolation doubtful. (23 outbreaks.)		(4) Isolation enforced—disinfection doubtful. (58 outbreaks.)		(5) Disinfection enforced—Isolation neglected. (71 outbreaks.)		(6) Isolation enforced—disinfection neglected. (48 outbreaks.)		(7) Isolation and disinfection both neglected. (162 outbreaks.)		(8) Isolation and disinfection both enforced. (228 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals...	14,771	177	11,706	51	1211	4	1443	17	1199	6	11,546	71	1565	21
Averages	5.20	.19	5.22	.16	3.80	.07	6.24	.24	4.15	.13	70.54	4.44	7.48	1.09

* These do not include the cases and deaths in Detroit, Grand Rapids, Lansing, Bay City, Kalamazoo, Saginaw, a few other cities, and Portsmouth, Grayling, Calumet and Osceola townships, because of the difficulty in determining the beginning and ending of an outbreak in these cities or townships, in which the disease was present in some part of the city or township nearly all the time.

† Includes deaths.

‡ These figures are graphically represented in the diagram on this page, entitled "Isolation and disinfection restrict scarlet fever."

ISOLATION AND DISINFECTION RESTRICT SCARLET FEVER.



This diagram graphically represents the lower line of figures in the last four columns of Table 7

[PLATE 1148]

TABLE 8.—SCARLET FEVER.—Exhibiting for the 15 years, and for each of the 15 years 1887-1901, the numbers of reported outbreaks, cases and deaths; also for this 15-year period, the average numbers of cases and deaths per outbreak in all outbreaks; in those outbreaks in which isolation or disinfection or both were doubtful; isolation and disinfection both neglected; isolation and disinfection both enforced; and, also, the numbers of cases and deaths indicated as having been prevented by isolation and disinfection.

Years.	* All outbreaks.			Isolation or disinfection, or both, not mentioned, or statements doubtful.			Isolation and disinfection both neglected.			Isolation and disinfection both enforced.			Cases and deaths indicated as having been prevented by isolation and disinfection.		
	Outbreaks.	Cases.†	Deaths.	Outbreaks.	Cases.†	Deaths.	Outbreaks.	Cases.†	Deaths.	Outbreaks.	Cases.†	Deaths.	Outbreaks.	Cases.†	Deaths.
1887.....	299	1,882	141	190	1,200	93	32	440	34	64	148	11	2,280	177	177
1888.....	340	1,838	112	225	1,453	74	61	784	33	36	80	3	2,198	72	72
1889.....	417	2,822	123	284	1,453	61	72	1,208	48	52	140	10	2,175	156	156
1890.....	477	3,054	115	302	1,711	67	94	1,197	35	42	76	1	2,718	66	66
1891.....	602	4,936	193	380	3,012	91	141	1,704	65	42	107	1	2,342	90	90
1892.....	622	5,240	306	377	2,944	138	110	1,621	59	42	97	7	3,928	30	30
1893.....	667	5,210	327	387	3,197	204	124	1,511	42	60	157	8	2,912	207	207
1894.....	662	4,349	175	378	2,396	93	104	1,348	42	74	187	9	4,231	90	90
1895.....	555	2,905	85	275	1,259	42	82	1,138	27	92	162	4	4,708	98	98
1896.....	349	1,534	42	148	485	15	80	63	16	78	153	4	1,776	38	38
1897.....	336	1,531	52	130	654	21	63	487	17	59	127	5	747	39	39
1898.....	397	1,759	74	140	645	24	52	441	23	88	202	6	1,608	101	101
1899.....	611	3,531	148	302	1,315	53	108	1,251	63	133	325	7	3,544	206	206
1900.....	753	4,389	218	306	1,762	93	138	1,459	63	165	417	26	3,778	142	142
1901.....	917	4,771	177	327	1,706	51	162	1,516	71	228	565	21	3,977	226	226
Totals.....	8,074	49,760	2,288	4,051	24,664	1,169	1,423	16,616	697	1,255	2,943	123	84,962	1,736	1,736
Averages, 15 years.....	538	3,317	153	270	1,644	78	95	1,108	46	84	196	8	2,997	116	116
Average cases and deaths per outbreak for fifteen years, 1887-1901.....		6.16	.28		6.09	.29		11.08	.49		2.35	.10			

* Outbreaks in Detroit, Grand Rapids and a few other localities, where the disease was present throughout the whole year, are not included, owing to the difficulty in determining the beginning and ending of an outbreak in those localities. The localities which are thus excluded in 1901, are given in a foot-note to Table 7 of this article; and for previous years, in foot-notes to similar tables in articles on scarlet fever for those years.

† Includes deaths.

The numbers of cases and deaths in this double column are found by multiplying "all outbreaks" for each year by the average numbers of cases or deaths per outbreak, in those outbreaks in which isolation and disinfection were both neglected for that year, and deducting from the results thus obtained, the cases or deaths, as the case may be, which were reported to have occurred that year. The two sets of numbers appearing in this column are based on two distinct methods of solution which are explained as follows: (1) The 41,832 cases and 1,736 deaths are totals of the columns representing cases and deaths saved as explained in the foot-note (2) the 43,844 cases and 1,608 deaths are obtained by multiplying the average number of cases and deaths per outbreak for the fifteen years, 1887-1901 (11.08 and .49 where isolation and disinfection were neglected) by the total number of outbreaks, to find the numbers which would have occurred if all outbreaks had been neglected, and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the fifteen year period.

TABLE 9.—*Exhibiting the reported period of incubation, stated in days, in 212 instances of scarlet fever. Compiled from reports of health officers in Michigan, for the year 1901.*

Incubation period—days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	21	25	26	29	33
Instances in each period.	*3	5	+13	‡12	§20	¶14	||35	**17	††16	‡‡26	§§3	¶¶6	2	||21	2	2	1	***1	†††8	1	2	1	1

* In one of these instances reported as about 1 day. † In 1 of these instances reported as about 3 days. ‡ In 3 of these instances, reported as about 4 days. § In 7 of these instances, reported as about 5 days. ¶ In 4 of these instances, reported as about 6 days. || In 13 of these instances, reported as about 7 days. ** In 7 of these instances, reported as about 8 days. †† In 6 of these instances, reported as about 9 days. ‡‡ In 12 of these instances, reported as about 10 days. §§ In one of these instances, reported as about 11 days. ¶¶ In 3 of these instances, reported as about 12 days. |||| In 3 of these instances, reported as about 14 days. *** In this instance, reported as about 18 days. ††† In one of these instances, reported as about 21 days.

TABLE 10.—*Exhibiting in certain age-groups, the numbers of cases and deaths from scarlet fever; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1901, which stated the ages.*

Number and per cent of cases and deaths in certain age-groups.																			
Ages in groups of years.....	All ages known.	0-1.	1-2.	2-3.	3-4.	4-5.	0-5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	Over 60.
No. of cases*...	5,479	68	152	316	355	463	1,362	2,331	1,114	364	130	67	48	33	18	5	4	0	3
Per cent the cases in each group were of all cases.....	.....	1.2	2.8	5.8	6.5	8.5	24.9	42.5	20.3	6.6	2.4	1.2	.9	.6	.3	.1	.1	0	.05
No. of deaths†.	254	20	33	42	31	25	151	73	6	10	6	2	3	2	0	0	0	0	1
Per cent the deaths in each group were of cases in that group.....	4.6	29.4	21.7	13.3	8.7	5.4	11.1	3.1	.5	2.7	4.6	3.0	6.3	6.1	0	0	0	0	33.3
Per cent the deaths in each group were of all deaths.....	.....	7.9	13.0	16.5	12.2	9.8	59.4	28.7	2.4	3.9	2.4	.8	1.2	.8	0	0	0	0	.4
Per cent the deaths in special groups were of all deaths.....		59.4					88.1		2.4	9.1				.4					

* Does not include cases where the age was not stated.

† Does not include deaths where the age was not stated

178 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 11.—*Exhibiting in certain age groups, the numbers of cases and deaths from scarlet fever in the year 1901, and in the nine years, 1892-1900; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths. Compiled from all reports for the years 1892-1901, which stated the ages.*

Year.		Total No. included.*	Per cent of cases and deaths in certain age-groups.										
			All ages.	0 to 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.
1901.	Cases.....	5,479	100	24.9	42.5	20.3	6.6	2.4	1.2	.9	.6	.3	.2
	Deaths.....	254	100	59.4	28.7	2.4	3.9	2.4	.8	1.2	.8	0	.4
1892-1900.	Cases.....	23,967	100	30.2	41.1	18.0	5.6	2.1	1.3	.7	.5	.2	.2
	Deaths.....	1,108	100	55.6	29.4	9.5	2.7	1.4	.2	.6	.4	.3	0

* In this table cases include both fatal and non-fatal cases.

TABLE 12.—*Exhibiting, by sex, and in certain age-groups, the per cent of persons who died from scarlet fever in Michigan, during the year 1901, and the eight years, 1893-1900; also the average age at death, and the number of deaths included. (Compiled from such reports as stated the ages.)*

Deaths from scarlet fever.														
Year.	Sex.	Average age, years.	No. of deaths included.	Ages.—In period of years. Per cent of deaths in each period of age.										
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.
1901.	Males.....	5.8	126	100	62.7	26.2	.8	4.8	2.4	.8	1.6	0	0	.8
	Females.....	5.8	128	100	56.3	31.3	3.9	3.1	2.3	.8	.8	1.6	0	0
1893-1900.	Males.....	5.3	478	100	56.1	31.6	7.1	3.3	.6	.4	.4	.4	0	0
	Females.....	6.2	502	100	50.2	31.1	11.9	3.2	2.0	.2	.6	.4	.4	0

TABLE 13.—*Exhibiting, by sex, the per cent of persons in certain age-groups who recovered from scarlet fever, in Michigan, during the year 1901, and the eight years, 1893-1900; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of non-fatal cases, years.	No. of cases included.	Age.—In periods of years. Per cent of (non-fatal) cases in each period of age.										
				All ages.	Under 5 ye's.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.
1901.	Males.....	8.5	2,413	100	24.4	43.6	20.6	6.8	2.0	.9	.7	.6	.2	.1
	Females..	9.0	2,812	100	22.2	42.9	21.7	6.7	2.7	1.6	1.0	.6	.4	.1
1893-1900.	Males.....	7.9	8,867	100	28.2	43.7	18.7	5.0	2.0	1.0	.6	.5	.2	.1
	Females..	8.9	10,417	100	23.4	42.7	21.2	6.3	2.6	1.5	1.0	.7	.3	.1

Duration of sickness from reported scarlet fever.—The duration of sickness of fatal cases in 1901 was given in seventy-three instances among males and in eighty-two instances among females. Of these, the greatest per cent died before the sixth day of sickness. The average duration of sickness in these fatal cases for the year 1901 was 11.5 days for males and 11.7 days for females. For the eight years, 1893-1900, the average duration of fatal cases was 11.3 days for males and 11.1 days for females.

The average duration of non-fatal cases of scarlet fever for the year 1901 was 22.9 days for males and 22.8 days for females. For the eight years, 1893-1900, the average duration of sickness for non-fatal cases was 18.8 days for males and 20.3 days for females.

TABLE 14.—*Exhibiting, by sex of patient, by per cent of cases which died in specified periods of time, the duration (in days) of fatal cases of sickness from scarlet fever in Michigan, during the year 1901, and the eight years, 1893-1900. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of scarlet fever.															
Year.	Sex.	No. of fatal cases in-cluded.	Average duration.	Duration of sickness:—Per cent of deaths in each period of days.											
				All periods	0 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1901.	Males....	73	11.5	100	42.5	13.7	11.0	13.7	8.2	9.6	1.4	0	0	0	0
	Females.	82	11.7	100	34.1	26.8	7.3	12.2	9.8	2.4	3.7	0	2.4	1.2	0
1893-1900.	Males....	322	11.3	100	37.6	26.4	13.4	6.8	5.3	3.4	3.1	1.6	.6	0	1.9
	Females.	351	11.1	100	41.0	21.9	14.8	7.7	6.0	1.7	2.8	.6	1.1	.9	1.4

TABLE 15.—*Exhibiting, by sex of patient, by per cent of cases which recovered in specified periods of time, the duration (in days) of non-fatal cases of sickness from scarlet fever in Michigan, during the year 1901, and the eight years, 1893-1900. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-fatal cases of scarlet fever.															
Year.	Sex.	No. of cases included.	Average duration.	Duration of sickness:—Per cent of non-fatal cases in each period of days.											
				All periods.	0 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	Over 50 days.
1901.	Males....	1,834	22.9	100	2.4	8.9	17.2	15.2	19.4	18.2	7.1	4.3	2.8	2.1	2.4
	Females..	2,115	22.8	100	2.5	10.7	15.9	14.1	20.3	15.6	8.6	5.6	3.0	1.6	2.0
1893-1900.	Males....	6,238	18.8	100	3.5	16.7	19.3	16.7	15.2	12.3	6.7	4.0	2.5	1.4	1.6
	Females..	7,193	20.3	100	2.9	15.9	20.4	16.8	16.1	12.6	6.6	3.6	2.5	1.2	1.3

RÖTHELN (GERMAN MEASLES) IN MICHIGAN IN 1901.

During the year ending December 31, 1901, there were reported to the Secretary of the State Board of Health fifteen outbreaks of rōtheln resulting in eighty-one cases.

There were four final reports in reference to the restriction of this disease sent to this office. Of these, in one outbreak only, were restrictive measures thoroughly enforced, in two outbreaks isolation was reported enforced, but disinfection was neglected.

The main reason for efforts for the restriction of rōtheln is the fact that scarlet fever is so often mistaken for rōtheln, so that in restricting what is apparently rōtheln a more fatal disease is sometimes restricted.

In all cases the public health should be given the benefit of any doubt, and precaution taken against the spread of any contagious disease which may prove to be dangerous.

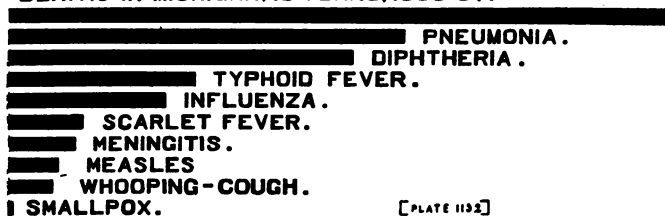
MENINGITIS IN MICHIGAN IN 1901.

During the year ending December 31, 1901, meningitis was reported to the Secretary of the State Board of Health in 409 localities in Michigan in which there were reported to have occurred 614 cases, including 594 deaths. It thus appears that, as a rule, only the fatal cases were reported. The reports relating to meningitis have been compiled under the various names reported, viz.: cerebro-spinal meningitis, cerebral meningitis, meningitis, spinal meningitis, tubercular meningitis, and traumatic meningitis, endeavoring by such separate statements to study the characteristics of the disease reported under each name, in case any difference statistically can be detected.

Table 1 shows that those cases and deaths reported as from simple meningitis were more numerous than those reported from any other title; and that the cases and deaths reported as from spinal meningitis were less than those reported from any other title excepting traumatic, of which there were twenty-two cases, all of which proved fatal.

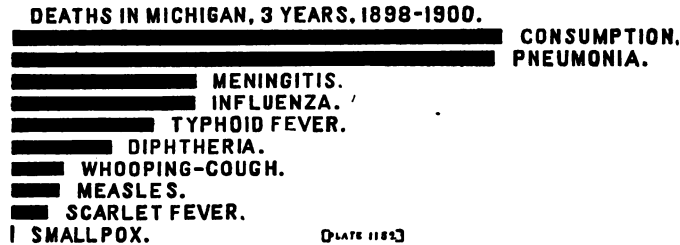
The importance of restricting meningitis.—In recent years meningitis has come to be of much greater importance than formerly. This is graphically shown by comparison of the two diagrams published herewith, Plates 1132

DEATHS IN MICHIGAN, 10 YEARS, 1888-97.



[PLATE 1132]

and 1152, the one exhibiting the relative importance of meningitis compared with other dangerous communicable diseases during the ten years 1888-1897, the other, during the three years 1898-1900.



[PLATE 1182]

TABLE 1.—*Cerebro-spinal meningitis, cerebral meningitis, meningitis, spinal meningitis, tubercular meningitis and traumatic meningitis in Michigan. The number of reported localities, cases and deaths, the average number of cases and deaths per locality, and the per cent of cases which proved fatal in 1901; also the total number of cases and of deaths from meningitis including those reported as tubercular and traumatic meningitis.*

Year 1901.	Reported localities.	Reported cases.	Average cases per locality.	Reported deaths.	Average deaths per locality.	Deaths per 100 cases reported.
Cerebro-spinal meningitis.....	117	161	1.38	154	1.32	95.65
Cerebral meningitis.....	51	70	1.37	70	1.37	100.00
Meningitis.....	132	227	1.72	218	1.65	96.04
Spinal meningitis.....	36	48	1.33	44	1.22	91.67
Total meningitis other than tubercular and traumatic...	336	506	1.51	486	1.45	96.05
Tubercular meningitis.....	51	86	1.69	86	1.69	100.00
Traumatic meningitis.....	22	22	1.00	22	1.00	100.00
Total meningitis.....	409	614	1.50	594	1.45	96.74

182 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 2.—Numbers of cases and deaths reported from meningitis,* tubercular meningitis, traumatic meningitis and the total cases and deaths from all forms of reported meningitis per 10,000 persons living in the State and in each county in Michigan during the year, 1901.

Counties.	Population.	Meningitis.*				Tubercular meningitis.				Traumatic meningitis.				Total meningitis.			
		No. of reported		No. per 10,000 population of		No. of reported		No. per 10,000 population of		No. of reported		No. per 10,000 population of		No. of reported		No. per 10,000 population of	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
State.....	2,450,872	506	486	2.06	1.98	86	86	.36	.36	22	22	.10	.10	614	594	2.51	2.42
Alcona.....	5,736	1		1.74	1.74									1		1.74	1.74
Alger.....	6,613	1		1.51	1.51									1		1.51	1.51
Allegan.....	38,748	6		5.15	1.29	2	2	.52	.52	1	1	.26	.26	9		8.23	2.06
Alpena.....	18,343	3		3.16	1.64									3		3.16	1.64
Antrim.....	17,256	5		5.29	2.90									5		5.29	2.90
Arenac.....	10,300	1		1.97	.97									1		1.97	.97
Baraga.....	4,335	1		1.23	2.31									1		1.23	2.31
Barry.....	22,315	5		4.24	1.78									5		4.24	1.78
Bay.....	62,556	16		15.25	2.40	8	8	1.28	1.28					24		23.84	3.68
Benzie.....	9,953					1	1	1.00	1.00					1		1.00	1.00
Berrien.....	49,752	6		6.12	1.21	1	1	.20	.20	1	1	.20	.20	8		8.16	1.61
Branch.....	28,077	6		6.21	2.14	3	3	1.07	1.07					9		9.32	3.21
Calhoun.....	49,621	7		7.14	1.41	2	2	.41	.41	2	2	.41	.41	11		11.23	2.22
Cass.....	20,826	2		2.95	.96									2		2.95	.96
Charlevoix.....	14,337	2		1.40	.70									2		1.40	.70
Cheboygan.....	15,875	2		2.12	1.26									2		2.12	1.26
Chippewa.....	22,338					2	2	.90	.90					2		.90	.90
Clare.....	8,423	2		2.37	2.37					1	1	1.19	1.19	3		3.56	3.56
Clinton.....	24,947	8		8.32	3.21									8		8.32	3.21
Crawford.....	2,961	1		0.35	0					1	1	3.35	3.35	2		1.67	3.35
Delta.....	24,649	4		4.12	1.62	2	2	.81	.81					6		6.24	2.43
Dickinson.....	18,421	2		2.10	1.09	2	2	1.09	1.09	1	1	.54	.54	5		5.27	2.71
Eaton.....	31,509	5		5.15	1.59					1	1	.32	.32	6		6.10	1.90
Emmet.....	16,854	7		6.41	3.56					1	1	.59	.59	8		7.47	4.15
Genesee.....	42,012	10		10.23	2.38									10		10.23	2.38
Gladwin.....	6,840	2		2.92	2.92									2		2.92	2.92
Gogebic.....	17,180	8		8.46	4.65	2	2	1.16	1.16					10		10.52	5.82
Grand Traverse.....	20,972	4		4.19	1.91					1	1	.48	.48	5		5.23	2.38
Gratiot.....	30,074	6		6.20	2.00	1	1	.33	.33					7		7.23	2.33
Hillsdale.....	29,796	8		8.26	2.68									8		8.26	2.68
Houghton.....	69,708	19		19.27	2.73	4	4	.57	.57	1	1	.14	.14	24		24.34	3.44
Huron.....	34,479	2		2.58	.58	1	1	.29	.29					3		3.87	.87
Ingham.....	39,839	3		2.75	.50	1	1	.25	.25	1	1	.25	.25	5		4.12	1.00
Ionia.....	34,246	2		2.58	.58									2		2.58	.58
Iosco.....	9,895	1		1.01	1.01									1		1.01	1.01
Iron.....	9,605	1		1.04	1.04	1	1	1.04	1.04					2		2.08	2.08
Isabella.....	23,007	6		6.21	2.61									6		6.21	2.61
Jackson.....	48,502	7		7.14	1.44	1	1	.21	.21	1	1	.21	.21	9		9.18	1.86
Kalamazoo.....	44,685	4		4.90	.90	3	3	.67	.67					7		7.15	1.57
Kalkaska.....	7,381	1		1.35	1.35	1	1	1.35	1.35					2		2.71	2.71
Kent.....	131,008	25		25.19	1.91	6	6	.46	.46					31		31.27	2.37

* Includes cerebral meningitis, cerebro-spinal meningitis, spinal meningitis and meningitis.

TABLE 2.—CONCLUDED.

Counties.	Population.	Meningitis.*				Tubercular meningitis.				Traumatic meningitis.				Total meningitis.			
		No. of reported		No. per 10,000 population of		No. of reported		No. per 10,000 population of		No. of reported		No. per 10,000 population of		No. of reported		No. per 10,000 population of	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Keweenaw.....	3,285	1	1	3.04	3.04	.....	.....	.....	.....	.....	.....	.....	.....	1	1	3.04	3.04
Lake.....	4,799	1	1	2.08	2.08	.....	.....	.....	.....	.....	.....	.....	.....	1	1	2.08	2.08
Lapeer.....	27,434	2	1	.73	.36	2	2	.73	.73	.....	.....	.....	.....	4	3	1.46	1.06
Leelanau.....	10,719	5	5	4.66	4.66	.....	.....	.....	.....	.....	.....	.....	.....	5	5	4.66	4.66
Lenawee.....	48,382	.....	.....	.....	.....	1	1	.21	.21	.....	.....	.....	.....	1	1	.21	.21
Livingston.....	19,534	2	2	1.02	1.02	.....	.....	.....	.....	.....	.....	.....	.....	2	2	1.02	1.02
Luce.....	3,088	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mackinac.....	7,780	1	1	1.29	1.29	.....	.....	.....	.....	.....	.....	.....	.....	1	1	1.29	1.29
Macomb.....	33,386	6	5	1.80	1.50	.....	.....	.....	.....	1	1	.30	.30	7	6	2.10	1.80
Manistee.....	28,145	6	6	2.13	2.13	2	2	.71	.71	.....	.....	.....	.....	8	8	2.84	2.84
Marquette.....	41,776	16	11	3.83	2.63	4	4	.96	.96	.....	.....	.....	.....	20	15	4.79	3.59
Mason.....	18,961	3	3	1.58	1.58	.....	.....	.....	.....	.....	.....	.....	.....	3	3	1.58	1.58
Mecosta.....	20,687	6	6	2.90	2.90	.....	.....	.....	.....	.....	.....	.....	.....	6	6	2.90	2.90
Menominee.....	27,595	7	6	2.54	2.17	1	1	.36	.36	1	1	.36	.36	9	8	3.26	2.90
Midland.....	14,642	3	3	2.05	2.05	.....	.....	.....	.....	.....	.....	.....	.....	3	3	2.05	2.05
Missaukee.....	9,698	4	4	4.13	4.13	.....	.....	.....	.....	.....	.....	.....	.....	4	4	4.13	4.13
Monroe.....	32,682	8	8	2.45	2.45	1	1	.31	.31	2	2	.61	.61	11	11	3.37	3.37
Montcalm.....	32,519	7	7	2.15	2.15	1	1	.31	.31	.....	.....	.....	.....	8	8	2.46	2.46
Montmorency.....	3,866	1	1	2.97	2.97	1	1	3.00	3.00	1	1	3.00	3.00	3	3	8.91	8.91
Muskegon.....	36,988	8	8	2.16	2.16	3	3	.81	.81	.....	.....	.....	.....	11	11	2.97	2.97
Newaygo.....	17,430	1	1	.57	.57	2	2	1.15	1.15	.....	.....	.....	.....	3	3	1.72	1.72
Oakland.....	45,141	9	9	1.99	1.99	.....	.....	.....	.....	1	1	.22	.22	10	10	2.22	2.22
Oceana.....	16,651	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ogemaw.....	8,119	1	1	1.23	1.23	.....	.....	.....	.....	.....	.....	.....	.....	1	1	1.23	1.23
Ontonagon.....	6,083	1	1	1.64	1.64	.....	.....	.....	.....	.....	.....	.....	.....	1	1	1.64	1.64
Osceola.....	18,089	5	5	2.76	2.76	1	1	.55	.55	.....	.....	.....	.....	6	6	3.32	3.32
Oscoda.....	1,412	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Otsego.....	6,404	3	3	4.68	4.68	.....	.....	.....	.....	.....	.....	.....	.....	3	3	4.68	4.68
Ottawa.....	39,763	6	6	1.51	1.51	.....	.....	.....	.....	.....	.....	.....	.....	6	6	1.51	1.51
Presque Isle.....	9,304	4	4	4.30	4.30	.....	.....	.....	.....	.....	.....	.....	.....	4	4	4.30	4.30
Roscommon.....	1,808	2	0	11.06	0	.....	.....	.....	.....	.....	.....	.....	.....	2	0	11.06	0
Saginaw.....	81,117	21	21	2.59	2.59	.....	.....	.....	.....	.....	.....	.....	.....	21	21	2.59	2.59
Sanilac.....	35,239	2	2	.57	.57	1	1	.28	.28	.....	.....	.....	.....	3	3	.85	.85
Schoolcraft.....	8,015	2	2	2.50	2.50	.....	.....	.....	.....	.....	.....	.....	.....	2	2	2.50	2.50
Shiawassee.....	34,074	6	6	1.76	1.76	.....	.....	.....	.....	.....	.....	.....	.....	6	6	1.76	1.76
St. Clair.....	55,378	9	9	1.63	1.63	4	4	.72	.72	1	1	.18	.18	14	14	2.53	2.53
St. Joseph.....	23,688	6	6	2.53	2.53	.....	.....	.....	.....	.....	.....	.....	.....	6	6	2.53	2.53
Tuscola.....	36,135	11	11	3.04	3.04	.....	.....	.....	.....	1	1	.28	.28	12	12	3.32	3.32
Van Buren.....	33,641	4	4	1.19	1.19	.....	.....	.....	.....	.....	.....	.....	.....	4	4	1.19	1.19
Washtenaw.....	48,469	8	8	1.65	1.65	.....	.....	.....	.....	1	1	.21	.21	9	9	1.86	1.86
Wayne.....	358,179	110	108	3.07	3.02	18	18	.50	.50	.....	.....	.....	.....	128	126	3.57	2.52
Wexford.....	17,310	6	5	3.47	2.89	.....	.....	.....	.....	.....	.....	.....	.....	6	5	3.47	2.89

* Includes cerebro meningitis, cerebro-spinal meningitis, spinal meningitis and meningitis.

Relating to nomenclature, cases in the same locality, same outbreak, having the same symptoms, have been variously called cerebro-spinal meningitis, cerebral meningitis, spinal meningitis, or meningitis. It thus appears that while in some instances a distinction based on certain characteristics of the disease, is made, it more frequently occurs that the above mentioned terms are used indiscriminately in designating any form of the disease, except sometimes the tubercular, and the traumatic. As the prevalence of meningitis in the State has not been general, except during epidemic periods, health officers and physicians have not been given the opportunity of becoming familiar in their general practice with the causes, modes of communication, etc., of this disease as with some of the other communicable diseases whose prevalence each year is common and expected. When a thorough knowledge of this disease becomes general, better and more satisfactory reports may be expected.

As is shown in Table 1, meningitis (including traumatic and tubercular meningitis) was reported present in 409 localities in Michigan in 1901. In these localities 614 cases of sickness were reported to have occurred, of which 594 were fatal; thus indicating that in 1901 as in the two previous years, 1899 and 1900, as a rule, only fatal cases were reported; there being an average of 1.50 cases of sickness and 1.45 deaths per locality, and a general fatality from meningitis in the State of 96.74 deaths per one hundred cases reported.

Distribution of meningitis throughout the State.—Table 2 shows the amount of reported sickness and deaths in each county in the State during the year 1901, from meningitis. The county having the greatest number of reported cases of sickness and of deaths was Wayne, where 128 cases, of which 126 died, were reported to have occurred. From each of twelve counties in the State, Alcona, Alger, Arenac, Baraga, Benzie, Iosco, Keweenaw, Lake, Lenawee, Mackinac, Ogemaw and Ontonagon there was reported but one fatal case.

Sickness and death-rates from meningitis.—Table 2 shows by counties the distribution of reported cases of sickness and deaths from this disease; it shows also the deaths per 10,000 population for each county and for the State. From these death-rates a better understanding of the comparative amount of sickness and death from the disease in each county may be obtained.

It is shown in Table 2, that the highest death-rate (8.91) was in Montmorency county, and the lowest, in which any death occurred (.21), was in Lenawee county. No case was reported as having occurred in either of the counties of Luce, Oceana and Oscoda.

TABLE 3.—*Exhibiting for the years 1899, 1900 and 1901, a comparison of all forms of meningitis in the number of reported localities, cases and deaths, the average number of cases and deaths per locality; and per cent of reported cases which proved fatal in each of the years.*

Year.	Reported localities.	Reported cases.	Average cases per locality.	Reported deaths.	Average deaths per locality.	Deaths per 100 cases reported.
1899.....	544	1,306	2.40	1,079	1.98	82.62
1900.....	451	747	1.66	688	1.53	92.10
1901.....	409	614	1.50	594	1.45	96.74

TABLE 4.—*Exhibiting the number of cases of meningitis which began and the number which were present in each month of the year 1901, in Michigan. (Compiled from reports to this office by health officers and physicians.) Also, by months, the average temperature, at stations in Michigan, in 1901.*

Cases.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Began.....	31	21	49	43	46	34	34	34	36	16	24	17
Present.....	61	48	78	82	83	63	78	54	68	38	37	42
Av. Temp.....	24.11	16.66	31.81	46.34	55.28	67.96	75.31	70.00	62.48	51.20	35.09	24.36

TABLE 5.—*Exhibiting by sex, in certain age-groups, the reported number of deaths from meningitis* and tubercular meningitis and the per cent the deaths in each group were of the total number of deaths reported for the disease; also the average age of fatal cases and total number of deaths included. (Compiled from such reports for the year 1901 which stated the age.)*

Meningitis *															
Year.	Sex.	Average age of fatal cases.	No. of cases included.	Age.—In periods of years. Number and per cent of fatal cases in each period of age.											
				All ages.	Under 5 years	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1901.	Males....	11	265	.....	165	21	6	16	10	10	4	8	8	2	15
	Females.	10	219	.....	122	28	11	15	9	4	7	6	5	3	9
1901.	Per cent the fatal cases in each age-group were of all fatal cases of known ages.			100	62	8	2	6	4	4	2	3	3	1	6
				100	56	13	5	7	4	2	3	3	2	1	4
Tubercular meningitis.															
Year.	Sex.	Average age of fatal cases.	No. of cases included.	Age.—In periods of years. Number and per cent of fatal cases in each period of age.											
				All ages.	Under 5 years	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1901.	Males....	6	53	.....	39	7	1	0	1	1	2	1	0	0	1
	Females.	8	33	.....	19	4	3	1	2	1	0	3	0	0	0
1901.	Per cent the fatal cases in each age-group were of all fatal cases of known ages.			100	74	13	2	0	2	2	4	2	0	0	2
				100	58	12	9	3	6	3	0	9	0	0	0

*Includes cerebral meningitis, cerebro-spinal meningitis, spinal meningitis and meningitis.

Table 3 shows a gradual decrease in the prevalence of meningitis since 1899, the epidemic year.

Good authorities state that, with reference to measures for its restriction, epidemic cerebro-spinal meningitis should be placed in the same category as phthisis pulmonalis, and effective effort should be exercised

in the restriction and prevention of this disease as in other dangerous communicable diseases. It is, therefore, desirable to have all cases occurring in the State reported in detail to the Secretary of the State Board of Health, that the compilation of statistics relating to this disease may be more complete and useful.

The first line in Table 4 shows the number of cases which began in each month of the year 1901. The second line of figures shows the number of cases reported sick in any part of each month. As some of the cases were sick longer than one month, they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1901. The last line of Table 4 gives by months, the average temperature, at stations in Michigan, in 1901, which may serve, in a limited way, as a basis for showing the relation of the prevalence of meningitis to temperature.

Of the 484 persons who died of meningitis in the State during the year 1901, the ages of whom were reported to this office, the largest percentage of deaths, 287, or sixty per cent, were of ages under five years; and 336, or sixty-nine per cent, died at ages under nine years, indicating that the disease exists largely among children. The average age of decedents included under the title meningitis was, for males eleven, and for females ten years.

Of the 86 persons who died of tubercular meningitis in the State during the year 1901, the ages of whom were reported to this office, the largest percentage of deaths, 58, or sixty-seven per cent, were of ages under five years; and 69, or eighty per cent, died at ages under nine years. The average age of decedents from tubercular meningitis was, for males six and for females eight years.

TABLE 6.—*Exhibiting by sex, in certain age-groups, the reported number of persons who recovered from meningitis* in Michigan during the year 1901; also the average age and number of cases included. (Compiled from all reports for the year 1901 which stated the age.)*

Meningitis.*															
Year.	Sex.	Average age of non-fatal cases, years.	No. of cases included.	Age.—In periods of years. Number and per cent of (non-fatal) cases in each period of age.											
				All ages.	Under 5 years	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1901.	Males....	5	4	.....	2	1	1	0	0	0	0	0	0	0
	Females.	22	4	.....	0	1	0	0	0	2	1	0	0	0
1901.	Per cent the non-fatal cases in each age-group were of all non fatal cases of known ages.			100	50	25	25	0	0	0	0	0	0	0	
				100	0	25	0	0	0	50	25	0	0	0	

*Includes cerebral meningitis, cerebro-spinal meningitis, spinal meningitis and meningitis.

Table 6 shows that but eight cases, of whom the ages were reported to this office, recovered from meningitis. The limited number of non-fatal cases reported makes impossible, in a single year, a satisfactory study of the ages of non-fatal cases; but the table may serve as a starting point.

TABLE 7.—Exhibiting by sex of patient the duration in days of fatal cases of sickness from meningitis* and tubercular meningitis, in Michigan in the year 1901. The number and per cent of deaths arranged in five day groups. (Compiled from those reports which stated the length of time the patient was sick.)

Meningitis.*															
Year.	Sex.	Average duration of fatal cases.	No. of cases included.	Duration of sickness.—Number and per cent of fatal cases in each period of days.											
				All periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1901.	Males....	11	158	.....	65	40	27	7	5	2	3	3	2	1	3
	Females.	10	146	.....	61	38	23	6	9	3	0	0	0	3	3
1901.	Per cent of deaths in each period of age.			100	41	25	17	4	3	1	2	2	1	.6	2
				100	42	26	16	4	6	2	0	0	0	2	2
Tubercular meningitis.															
Year.	Sex.	Average duration of fatal cases.	No. of cases included.	Duration of sickness.—Number and per cent of fatal cases in each period of days.											
				All periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1901.	Males....	18	30	.....	5	6	7	5	2	2	1	0	0	0	2
	Females.	15	22	.....	3	7	6	2	1	1	1	0	0	0	1
1901.	Per cent of deaths in each period of age.			100	17	20	23	17	7	7	3	0	0	0	7
				100	14	32	27	9	5	5	5	0	0	0	5

*Includes cerebral meningitis, cerebro-spinal meningitis, spinal meningitis and meningitis.

TABLE 8.—Exhibiting by sex of patients and by number and per cent, the duration in days of non-fatal cases of sickness from meningitis* in Michigan, during the year 1901. (Compiled from those reports which stated the time the patient was sick.)

Meningitis *															
Year.	Sex.	Average duration of non-fatal cases.	No. of cases included.	Duration of sickness.—Number and per cent of non-fatal cases in each period of age.											
				All periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1901.	Males....	29	5	.....	0	0	0	2	0	1	0	1	1	0	0
	Females.	23	5	.....	1	0	1	0	0	1	2	0	0	0	0
1901.	Per cent of non-fatal cases in each period of age.			100	0	0	0	40	0	20	0	20	20	0	0
				100	20	0	20	0	0	20	40	0	0	0	0

*Includes meningitis reported as cerebral meningitis, cerebro-spinal meningitis, spinal meningitis, and meningitis.

Table 7 shows that for the year 1901 the average duration of fatal cases of meningitis was for males 11 days, and for females 10 days.

The average duration of fatal cases of tubercular meningitis was for males 18 days, and for females 15 days.

In Table 8 it may be noticed that the duration of but ten non-fatal cases were reported which indicates as in Table 6, relative to the age of non-fatals, that a too limited number of non-fatal cases are reported to obtain from the cases in a single year any valuable conclusions on the duration of sickness from the disease.

CAUSE, OR SOURCE OF CONTAGIUM OF MENINGITIS.

TABLE 9.—*Exhibiting, for each of the differently named sorts of meningitis, in Michigan, in 1901, the reported cause, origin, or source of contagium.*

Alleged source, origin, or cause.	Cerebral meningitis.	Cerebro-spinal meningitis.	Menin-gitis.	Spinal menin-gitis.	Tuber-cular menin-gitis.	Total of all menin-gitis.
Not stated.....	40	90	141	25	53	349
Unknown.....	17	42	37	12	19	127
Result of cold.....	2	5	1	1	2	11
Pneumonia.....	1	2	6	1	1	11
Exposure.....	2	6	5	1	0	14
La grippe.....	0	2	5	0	0	7
Influenza.....	0	4	3	0	0	7
Bronchitis.....	0	0	0	0	1	1
Rheumatism.....	1	0	0	0	0	1
Diarrhea.....	1	2	0	0	0	3
Dysentery.....	0	0	1	0	1	2
Cholera infantum.....	0	0	1	1	0	2
Catarrh of bowels.....	0	1	0	0	0	1
Gastritis.....	0	0	1	0	0	1
Gastro enteritis.....	0	1	2	0	0	3
Stomach trouble.....	1	0	1	0	0	2
Spina bifida.....	0	1	1	0	0	2
Spasms.....	0	1	0	0	0	1
Brain disease.....	0	0	1	0	0	1
Optic neuritis.....	0	0	1	0	0	1
Middle ear disease.....	2	1	1	0	0	4
Otitis media.....	0	0	4	1	0	5
Diphtheria.....	0	0	1	0	0	1
Whooping-cough.....	0	0	1	0	0	1
Remittent fever.....	1	0	0	0	0	1
Typhoid complications.....	0	1	1	0	0	2
Measles.....	0	0	1	0	0	1
Erysipelas.....	0	0	1	0	0	1
Consumption.....	0	0	0	0	6	6
Scarlet fever.....	0	0	0	1	0	1
Tuberculosis of joints.....	0	0	0	0	1	1
Syphilis.....	0	0	1	0	0	1
Teething.....	0	0	1	0	0	1
Continued fever.....	0	0	1	0	0	1
Septic poisoning.....	0	0	1	0	0	1
Sporadic.....	0	0	1	1	0	2
Septicemia.....	0	0	0	1	0	1
Overwork.....	0	1	0	1	0	2
Excessive cigarette smoking.....	0	0	0	1	0	1
Vitiated vitality.....	0	0	0	0	1	1
Excessive use of alcohol.....	0	0	1	0	0	1
Headache.....	1	0	0	0	0	1
Old age.....	0	0	1	0	0	1
Previous case.....	1	1	1	1	1	5
Total.....	70	161	225	48	86	590

Source of contagium of meningitis.—Table 9 is an attempt to learn something of the source of contagium of the disease, and its mode of transmission from person to person. In 1901 as in the two years previous, 1899 and 1900, it has been difficult to obtain definite information relating to this question, other than "not stated" and "unknown." Of the 590 cases of the disease which occurred in the State in 1901, the source of contagium in 476 instances was reported as "unknown" or "not stated." Of the remaining 114, fifty-two were attributed to the result of a cold and to some of the cold weather diseases, as follows: Pneumonia, la grippe, influenza, bronchitis and rheumatism. Fourteen were attributed to warm weather diseases as follows: Diarrhea, dysentery, cholera infantum, catarrh of bowels, gastro-enteritis and stomach trouble. Nine cases were traced to middle ear diseases. Eighteen cases were attributed to some of the dangerous communicable diseases, as follows: Diphtheria, whooping-cough, typhoid fever, measles, erysipelas, consumption, scarlet fever, tuberculosis of joints, syphilis, and continued fever. Ten cases were attributed to a variety of causes, such as overwork, sporadic, septicemia, excessive cigarette smoking, vitiated vitality, alcoholism, headache and old age. Five cases were attributed as originating with previous cases.

It must be seldom that the spread of meningitis can be traced directly to a preceding case of meningitis. In fact, to the Secretary of the State Board of Health, it seems that it may be seldom that meningitis is spread directly from a well-developed case of meningitis; because he sees no way whereby the germs can get from the coverings of the brain and spinal cord of one person to those of another person. Probably the germs enter the body by way of the nose and throat, and that they are spread from the nose and throat of the infected person. After meningitis is developed the germs may no longer be present in the nose or throat.

There are two quite distinct views possible as to the causation of meningitis. Prominent medical authors seem to consider that epidemic cerebro-spinal meningitis is caused by one specific micro-organism,—the diplococcus intracellularis meningitidis. Another view is that the micro-organism of any inflammatory disease to which the human body is subject, if it gains access to the meninges may cause meningitis. According to this view a person sick with any such communicable disease as pneumonia, influenza, or tuberculosis, may be the source of the germs which in another person may cause meningitis. According to this view, whenever those diseases are epidemic or unusually prevalent, meningitis is also likely to be unusually prevalent. The statistics in this State have, several times, illustrated the truth of this proposition. In this connection the foregoing summary is interesting,—commencing with the words "Of the remaining 114, fifty-two were attributed," etc.

These facts, however, are also consistent with the above first mentioned view,—that the diplococcus intracellularis meningitidis is the specific cause of meningitis; because the same conditions in the environment, such as the meteorological conditions, which tend to favor the introduction into human bodies of the germs of the other communicable diseases may also tend to favor the introduction of the diplococcus of meningitis.

MEASLES IN MICHIGAN.—DURING THE YEAR ENDING DECEMBER 31, 1901.

There were reported by local health officers to the Secretary of the State Board of Health, in all 360 outbreaks of measles, in 303 local jurisdictions, as having occurred in Michigan during the year 1901; and in these outbreaks there were reported to have occurred 4,629 cases,* including 62 deaths.

The office of the State Board of Health is making constant efforts to get local health officials, and the people generally, to take measures to prevent the spread of measles, and to make reports to the local health officers and they to the Secretary of the State Board of Health, concerning that disease in the several localities; but it is probable that a large number of cases are not yet reported. From Detroit, in 1901, five fatal cases only were reported, and from six other localities fatal cases only were reported. These localities are stated on a subsequent page of this article.

MEASLES IN 1901, COMPARED WITH PREVIOUS YEARS.

Under the present law, all deaths are reported to the Secretary of State, therefore this comparison may well take account of the reports to that officer as well as to this office.

According to reports made to the Secretary of the State Board of Health.—Compared with 1900, Table 1 shows a decrease of 602 outbreaks, 15,774 cases,* 220 deaths, and a decrease of 8.3 cases per outbreak and .12 of one death per outbreak.

The fatality for the entire State in 1901 (including localities from which only fatal cases were reported), was 1.3 per cent,—a decrease of .1 of one death per 100 cases reported, from the fatality in 1900. The fatality for the State in 1901, exclusive of Detroit and Baraga village, where only fatal cases were reported, was 1.1 per cent. (There were other localities from which only fatal cases were reported which are not excluded because of the slight difference made in the rates.) In 1900, exclusive of Detroit and Bay City, from which only fatal cases were reported, it was 1.2 per cent. The decrease, .1 of one death per 100 cases, in fatality in 1901 from 1900 was the same when these places were excluded as when they were not.

Compared with the averages for the eleven years, 1890-1900, the decrease in 1901 was 128 outbreaks, 8,245 cases* and 69 deaths. The average number of cases per outbreak in 1901 was 13.4 cases less than for the eleven years, and the average number of deaths per outbreak was but .1 of one death less. The fatality apparent for 1901 increased by .3 of one death per 100 cases.

According to reports made to the Secretary of State.—Table 2 is based upon returns of deaths made to the Secretary of State. For all years preceding 1898 the statistics of deaths were collected after the close of the year in which they occurred; for all years after 1897 the deaths were recorded before burial, and returns were made to the Secretary of State

* Throughout this article "cases" include both fatal and non-fatal cases.

early in the following month. There is reason to believe that under the new law nearly all deaths are included in the statistics, whereas before 1898 a considerable proportion was omitted. This fact should be held in mind in comparing the deaths reported for the year 1901 with those reported in years previous to 1898. The death-rate for the year 1901 (3.0) is that stated in the Bulletin of Vital Statistics. The rates computed for previous years have been made from the *final* compilation of deaths from measles made by the Department of Vital Statistics. The final compilation for 1901 has not been made, consequently this rate (3.0), may not be quite accurate, because where two diseases are mentioned as causing a death, as not infrequently occurs, not always the same one is used in the final compilation as in the Bulletin of Vital Statistics.

TABLE 1.—*Exhibiting the number of outbreaks, cases and deaths from measles, the number of localities in which they occurred, the average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal, for the year 1900 and 1901, and the averages for the 11 years, 1890-1900; with the departures of the same for 1901, from 1900 and from the average of the same for the 11 years, 1890-1900.*

Year.	Reported outbreaks.	Reported localities.	Reported cases.	Av.No. of cases per outbreak.	Reported deaths	Av.No. of deaths per outbreak.	Deaths per 100 cases.
1900.....	962	733	20,403	21.2	282	.29	1.4
1901.....	360	303	4,629	12.9	62	.17	1.8
Departure of 1901 from 1900.....	-602	-430	-15,774	-8.3	-220	-.12	-.1
Average for 11 years, 1890-1900.....	488	421	12,874	26.3	131	.27	1.0
Departures of 1901 from the averages for 11 years, 1890-1900	-128	-118	-8,245	-13.4	-69	-.10	+ .3

TABLE 2.—*Exhibiting the reported number of deaths from measles per 100,000 persons living in Michigan in each of the 34 years, 1868-1901. (Compiled from the Secretary of State's Vital Statistics of Michigan. Population for intercensal years estimated by average annual increase based on National and State Censuses.)*

Year.		1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
Deaths (per } 100,000, etc.) }		8.66	12.88	4.72	5.45	14.12	18.56	3.37	9.50	8.10	4.13	1.03	10.49	7.63	15.21
Year.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths { etc... }	8.68	14.54	7.91	2.04	6.75	14.56	20.62	5.08	10.94	10.51	3.29	5.76	3.75	1.93	5.22
Year.	1897.	1898.	1899.	1900.	1901.										
Deaths } etc... }	8.2	5.6	7.8	14.1	3.0										

Sickness-rates from reported measles.—In comparing sickness-rates it should be borne in mind that many cases of sickness from measles are not reported, and that it is probable that the omissions are greater in some parts of the State than in others. In Detroit only the five fatal cases were reported. (If the ratio of deaths to cases was the same there as in the other parts of the State, the cases of measles in Detroit were 455.)

Also from the following places only fatal cases were reported: Baraga village, five fatal cases, Felch township, three fatal cases, Charleston township, two fatal cases, Evart village, Baraga and Hamtramck townships, each one fatal case. In one of these instances, disinfection was enforced, but isolation neglected, in the other instances the health officers did not report what was done to restrict the disease, or reported in such a manner that it was doubtful whether or not restrictive measures were enforced. This would suggest that there were other cases of sickness from measles in these localities and only the fatal cases reported. Other reports from local health officers show that all cases of sickness from measles are not reported.

The sickness-rate from reported measles for the State, excluding Detroit and Baraga village, where none but fatal cases were reported, was 21.42 cases per 10,000 population. By counties the highest sickness-rates were in Clinton, with 157.13 cases per 10,000 population, Barry, with 156.84, and Gogebic, with 154.25, each over six times the average rate for the State. The lowest sickness-rate, .53 of one case per 10,000 population, was in Mason county. Antrim (.58), Huron (.58), and Newaygo (.57) counties had the next lowest rates.

Death-rates from reported measles.—The death-rate from reported measles for the State was .25 of one death per 10,000 population. The highest death-rate, by counties, was in Baraga county, 20.76 deaths per 10,000 population.

The death-rate in Wayne county was .17 deaths per 10,000 population. Subtracting the population of Detroit from the population of Wayne county, the death-rate in Wayne county, exclusive of Detroit, was .16 of one death per 10,000 population; and the death-rate in Detroit was .17 of one death per 10,000 population.

Fatality, or "case mortality" by counties from reported measles.—The fatality from reported measles in 1901, i. e., the proportion of reported cases, which proved fatal was, for the whole State, 1.3 per cent, or about one death to 100 cases reported. The fatality for the state exclusive of Detroit and Baraga village, where none except fatal cases were reported, was 1.1 per cent. The maximum fatality (67 per cent) occurred in Ogemaw county. Probably this was because the mild cases were not as completely reported as in other localities. The minimum fatality (.26 of one death per 100 cases) occurred in Clinton county. In 43 counties from which sickness from measles was reported there were no deaths reported from this disease.

Distribution of measles in cities, villages and townships.—From the data in Table 4 it may be observed that 53.2 per cent of the cities, 20.6 per cent of the villages, and 16.3 per cent of the townships, were infected with measles. But the average population of the cities is over thirteen times the average population of the villages.* The highest case-rate (28.65) and death-rate (.32) occurred in the villages.

* The average population of the cities is 12,148, of the villages, 910, and of the townships, 1,003.

TABLE 3.—Numbers of cases and deaths reported from measles, and the cases and deaths per 10,000 persons living in each county in Michigan during the year 1901.

State and counties.	Estimated population of Michigan for 1901.*	Number of reported		Number per 10,000 population of		Counties.	Estimated population of Michigan for 1901.*	Number of reported		Number per 10,000 population of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,450,872	†4,619	62	‡21.42	.25	Keweenaw ..	3,285	0	0	0	0
						Lake.....	4,799	0	0	0	0
Alcona.....	5,736	0	0	0	0	Lapeer.....	27,434	29	0	10.57	0
Alger.....	6,613	0	0	0	0	Leelanau....	10,719	8	0	7.46	0
Allegan.....	38,748	262	2	67.61	.52	Lenawee....	48,382	21	0	4.34	0
Alpena.....	18,343	0	0	0	0	Livingston...	19,534	7	0	3.64	0
Antrim.....	17,256	1	0	.58	0	Luce.....	3,088	0	0	0	0
Arenac.....	10,300	0	0	0	0	Mackinac....	7,780	0	0	0	0
Baraga.....	4,335	†29	9	†92.56	20.76	Macomb.....	33,386	46	0	13.78	0
Barry.....	22,315	350	1	156.84	.45	Manistee....	28,145	4	0	1.42	0
Bay.....	62,556	17	0	2.72	0	Marquette...	41,775	413	4	98.86	.96
Benzie.....	9,953	1	0	1.00	0	Mason.....	18,961	1	0	.53	0
Berrien.....	49,752	129	1	25.93	.20	Mecosta.....	20,687	2	0	.97	0
Branch.....	28,077	148	1	52.71	.36	Menominee..	27,595	2	0	.72	0
Calhoun.....	49,621	305	1	61.47	.20	Midland.....	14,642	3	0	2.05	0
Cass.....	20,826	58	0	27.85	0	Missaukee....	9,698	3	0	3.09	0
Charlevoix...	14,337	1	0	.70	0	Monroe.....	32,682	15	0	4.59	0
Cheboygan...	15,875	0	0	0	0	Montcalm....	32,519	98	4	30.14	1.23
Chippewa....	22,338	17	1	7.61	.45	Montmorency	3,366	0	0	0	0
Clare.....	8,423	45	0	53.43	0	Muskegon....	36,988	6	0	1.62	0
Clinton.....	24,947	392	1	157.13	.40	Newaygo....	17,430	1	0	.57	0
Crawford....	2,981	0	0	0	0	Oakland.....	45,144	17	0	3.77	0
Delta.....	24,649	19	0	7.71	0	Oceana.....	16,651	0	0	0	0
Dickinson...	18,421	18	3	9.77	1.63	Ogemaw.....	8,119	3	2	3.70	2.46
Eaton.....	31,509	288	1	91.40	.32	Ontonagon...	6,083	46	1	75.62	1.64
Emmet.....	16,854	38	0	22.55	0	Oscoda.....	18,189	32	1	17.69	.55
Genesee.....	42,012	71	0	16.90	0	Oscoda.....	1,412	0	0	0	0
Gladwin.....	6,840	7	0	10.23	0	Otsego.....	6,404	0	0	0	0
Gogebie.....	17,180	265	8	154.5	4.66	Ottawa.....	39,763	24	0	6.04	0
Gd. Traverse.	20,972	2	0	.95	0	Presque Isle.	9,304	3	0	3.22	0
Gratiot.....	30,074	63	1	20.95	.33	Roscommon..	1,808	0	0	0	0
Hillsdale....	29,796	335	2	112.46	.67	Saginaw.....	81,117	39	2	4.81	.25
Houghton...	69,708	18	0	2.58	0	Sanilac.....	35,239	15	0	4.26	0
Huron.....	34,479	2	0	.58	0	Schoolcraft..	8,015	3	0	3.74	0
Ingham.....	39,839	33	0	8.28	0	Shiawassee...	34,034	56	0	16.45	0
Ionia.....	34,246	51	0	14.89	0	St. Clair.....	55,378	32	0	5.78	0
Iosco.....	9,895	1	0	1.01	0	St. Joseph...	23,688	14	0	5.91	0
Iron.....	9,605	0	0	0	0	Tuscola.....	36,135	0	0	0	0
Isabella.....	23,007	5	0	2.17	0	Van Buren...	33,641	100	1	29.73	.30
Jackson.....	48,502	11	0	2.27	0	Washtenaw..	48,469	12	0	2.48	0
Kalamazoo...	44,685	478	8	106.97	1.79	Wayne.....	358,179	†56	6	†8.68	.17
Kalkaska....	7,381	4	0	5.42	0	Wexford.....	17,310	2	0	1.16	0
Kent.....	131,008	42	1	3.21	.08						

* Population estimated by average annual increase (arithmetical method), based on the State Census of 1894 and the U. S. Census of 1900.

† This number does not include the five fatal cases reported from Detroit, nor the five fatal cases reported from Baraga village.

‡ Excluding the population of Detroit and Baraga village, where none except fatal cases of measles were reported.

¶ The fatal cases and population for Baraga village and Detroit are not included in their respective counties in computing the case-rates for these counties.

194 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 4.—*Exhibiting the numbers of outbreaks and cases of and deaths from measles which occurred in the cities, villages, and townships of Michigan in 1901, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages and townships. (Compiled from reports of local health officers to the Secretary of the State Board of Health.)*

Classes of political divisions.	Estimated population.	Health jurisdictions.	Outbreaks in—			Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Rates per 10,000 population.			
			Localities.		No. of				Cases.	Deaths.	Cases.	Deaths.
			No. of	Per cent of all localities.								
State.....	2,450,872	1,595	303	19.0	360	4,629	62	*1.1	*21.42	.25		
Cities.....	959,711	79	42	53.2	49	1,544	22	*1.1	*23.11	.23		
Villages.....	282,146	310	64	20.6	70	810	9	*.5	*28.65	.32		
Townships.....	1,209,015	1,306	197	16.3	241	2,275	31	1.4	18.82	.26		

* Excluding Detroit and Baraga village, where none except fatal cases were reported.

TABLE 5.—*Exhibiting the reported number of outbreaks of measles which began, the number which ended, and the number which were present, in each month of the year 1901, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Number began.....	35	23	41	38	40	43	25	10	11	14	22	26	328
Number ended.....	18	12	29	27	38	38	47	18	11	14	14	20	286
Number present...	53	56	84	87	100	99	84	43	34	37	43	56	.....

TABLE 6.—*Exhibiting the number and per cent of cases of measles present, and the number and per cent of cases taken sick, and the number and per cent of localities infected in Michigan in each month of the year 1901.*

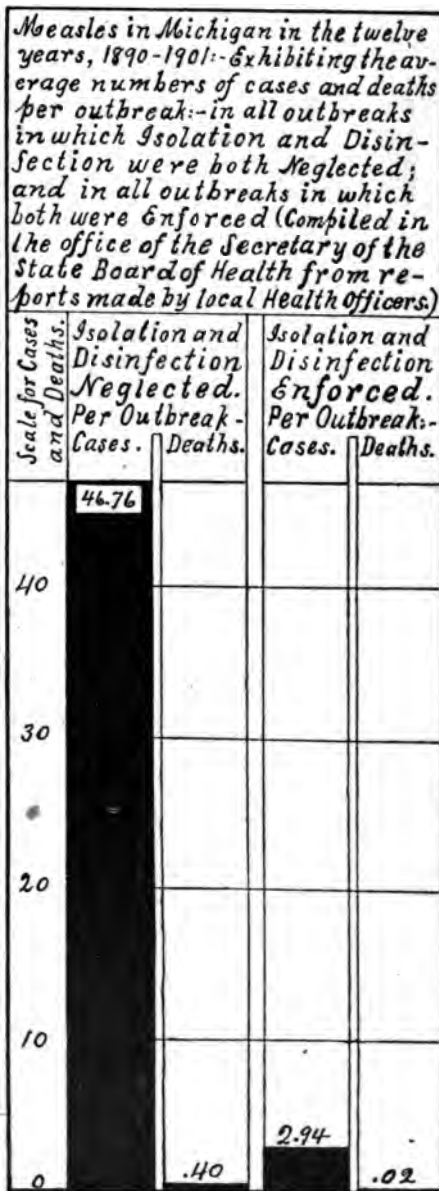
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases present.	257	285	538	496	671	725	370	111	96	252	321	443
Per cent of cases present	5.6	6.2	11.6	10.7	14.5	15.7	8.0	2.4	2.1	5.4	6.9	9.6
Number of cases taken sick.....	252	248	478	379	482	618	262	86	82	223	252	370
Per cent of cases taken sick.....	5.4	5.4	10.3	8.2	10.4	13.4	5.7	1.9	1.8	4.8	5.4	8.0
Number of localities present.....	53	56	83	85	100	97	81	42	34	37	43	56
Per cent of localities present.....	17.5	18.4	27.4	28.1	33.0	32.0	26.7	13.9	11.2	12.2	14.2	18.5

TABLE 7.—MEASLES IN MICHIGAN IN 1901.—Exhibiting the average numbers of cases and deaths per outbreak:—(1) in all the 350 outbreaks reported; (2) in the 159 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 1 outbreak in which disinfection was enforced and isolation doubtful; (4) in the 22 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 19 outbreaks in which disinfection was enforced and isolation neglected; (6) in the 20 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 93 outbreaks in which isolation and disinfection were both neglected; (8) in the 36 outbreaks in which isolation and disinfection were both enforced.

	(1) All outbreaks. (350 outbreaks.)*		(2) Isolation or disinfection or both not mentioned, or statements doubtful. (159 outbreaks.)		(3) Disinfection enforced—Isolation doubtful. (1 outbreak.)		(4) Isolation enforced—disinfection doubtful. (22 outbreaks.)		(5) Disinfection enforced—Isolation neglected. (19 outbreaks.)		(6) Isolation enforced—disinfection neglected. (30 outbreaks.)		(7) Isolation and disinfection both neglected. (93 outbreaks.)		(8) Isolation and disinfection both enforced. (36 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals....	5,025	58	2,550	37	1	0	160	1	215	3	63	1	1,961	16	75	0
Averages	14.36	.17	16.03	.23	1.00	0	7.27	.05	11.32	.16	3.15	.05	21.09	.17	2.08	0

* A definition of the term "outbreak," and the facts relative to methods of compilation of outbreaks, are printed in foot-notes on pages 199 and 200.

ISOLATION AND DISINFECTION RESTRICT MEASLES.



[PLATE 1142.]

TABLE 8.—*Exhibiting for the 12 years, and for each of the 12 years 1890-1901, the numbers of reported outbreaks, cases and deaths from measles; also for this 12-year period, the average number of cases and deaths per outbreak in all outbreaks; in those outbreaks in which isolation or disinfection or both were doubtful; isolation and disinfection both neglected; isolation and disinfection both enforced; and, also, the numbers of cases and deaths indicated as having been prevented by isolation and disinfection.*

Years.	All outbreaks.			Isolation or disinfection, or both, not mentioned, or statements doubtful.			Isolation and disinfection neglected.			Isolation and disinfection enforced.			Cases and deaths indicated as having been prevented by isolation and disinfection.*		
	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.
1890.....	419	11,189	103	353	6,326	59	57	4,819	44	6	24	233	220	24,233	220
1891.....	392	12,338	118	309	9,492	59	71	5,840	63	19	0	0	231	20,347	231
1892.....	336	4,406	67	187	2,427	48	31	1,833	22	27	0	0	101	10,462	101
1893.....	357	5,440	71	258	2,569	53	70	2,081	14	10	24	0	0	8,233	0
1894.....	358	7,345	43	246	4,190	42	70	2,971	7	13	23	0	0	7,849	0
1895.....	359	7,062	13	152	2,640	7	56	1,563	6	25	0	0	14	3,043	14
1896.....	398	17,068	158	172	4,118	26	146	12,038	131	72	0	0	201	17,438	201
1897.....	700	26,438	147	313	7,027	44	324	15,063	101	46	112	0	90	17,641	90
1898.....	512	9,318	101	219	2,683	47	165	6,150	49	49	118	2	53	9,764	53
1899.....	506	12,351	150	201	3,122	48	230	8,582	80	68	148	3	92	9,486	92
1900.....	849	15,402	194	315	4,845	52	338	9,380	124	72	388	1	139	9,880	139
1901.....	310	5,025	56	159	2,560	37	93	1,901	10	36	75	0	2	2,367	2
Totals for the twelve years, 1890-1901.....	5,553	180,892	1,219	2,869	49,069	519	1,651	77,209	666	356	1,045	6	1,333	1140,573	1,333
Annual averages for the 12 years, 1890-1901....	463	10,908	102	239	4,089	43	138	6,434	56	30	87	.5	94	11,714	94
Average cases and deaths per outbreak, 1890-1901.....	.....	23.57	.22	.....	17.10	.18	.....	46.76	.40	.....	2.94	.02	.....	.....	.....

* The numbers of cases and deaths in this double column are found by multiplying "All outbreaks" for each year by the average number of cases, or deaths per outbreak, in those outbreaks in which isolation and disinfection were both neglected, for that year, and deducting from the results thus obtained, the cases or deaths, as the case may be, which were reported to have occurred that year, to learn the numbers that would have occurred if efforts for the restriction of the disease had not been made. The instances in which isolation and disinfection were enforced are still so few that the evidence is not yet very satisfactory. The two sets of numbers appearing in this column are based on two distinct methods of solution which are explained as follows: (1) the 140,573 cases included in 1,133 deaths are totals of the columns representing cases and deaths saved as explained in the * foot-note; (2) the 128,766 cases, including 992 deaths, are obtained by multiplying the average number of cases and deaths per outbreak for the twelve years, 1890-1901 (46.76 and 40 respectively) and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the twelve-year period.

Number of outbreaks of measles in each month of the year 1901.—The last line of figures in Table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months.

In computing the number of cases present in each month, each case is counted present in each month in which, or part of which, it was reported to have existed. The number of localities infected in each month were computed in a like manner.

The second and fourth lines of figures in Table 6 exhibit what per cent the cases present in each month and the cases taken sick in each month were of the total number (4,629) of cases of measles reported to this office for the year 1901.

The last line of figures in this table exhibits what per cent the localities infected in each month were of the total number (303) of infected localities reported during the year 1901.

Source of the contagium of cases of measles.—Of the 4,629 cases of measles reported to this office, as having occurred in Michigan in the year 1901, the local health officials reported relative to the source of contagium in ways which may be summarized as follows: Traced to former case, 1,774; probably traced to a former case, 2; from outside jurisdiction, 113; probably from an outside jurisdiction, 2; unknown, 2,011; not stated, 723; attributed to infected articles, etc., 4.

In reference to the source of contagium of a case of measles in Marshall city, Calhoun county, the health officer, Dr. Louis S. Joy, wrote to this office as follows:

"The case of measles reported last week was in the family of Dr. Church. His wife brought home a shawl which she had used herself, five or six years ago, when she had the measles. She used it on her four months old baby and it came down with the measles. Do you think that the baby got it from the shawl? The doctor knows of no other exposure, his house is new, and he has not attended any other case."

The following quotations from two health officers' reports are fair samples of many received at this office from local health officers showing some of the difficulties they have in restricting this disease:

"Most parents wish their children to have measles when young and will even send them to become exposed."—*C. E. Doyle, M. D., Augusta village, Kalamazoo county.*

"The people in this vicinity regard measles as so trivial a matter as to rather encourage exposure than not, and upon my attempt to isolate and disinfect, simply laughed in my face and did as they chose."—*E. L. Street, M. D., La Fayette township, Gratiot county.*

Outbreaks of measles reported traced to previous outbreaks.—According to reports of local health officers in Michigan the contagium of measles was permitted to spread from forty-four outbreaks, having an aggregate of 970 cases, including twelve deaths, to seventy-four other outbreaks resulting in 1,528 cases, including eleven deaths. From some of these second localities, the contagium was further spread to third localities, resulting in nineteen outbreaks with 369 cases; from thence to fourth localities, resulting in two outbreaks with forty-five cases.

Thirty-nine outbreaks, with an aggregate of 792 cases, including four-

teen deaths, were reported as having been traced to localities outside of Michigan. From some of these thirty-nine outbreaks, the contagium was further spread to eighteen localities, resulting in 121 cases, including one death; from some of these third localities the contagium spread to fourth localities, resulting in two outbreaks, with five cases.

A total of 198 outbreaks, with an aggregate of 3,830 cases, including thirty-eight deaths, were actually traced to previous outbreaks of measles.

In five outbreaks, with an aggregate of thirty-seven cases, including one death, the contagium was reported as *probably* traced to other outbreaks in Michigan. One outbreak, with one case, was reported as *probably* traced to a locality outside of the State.

Immigrants possibly exposed to measles destined to settle in Michigan.
—During the year, twelve notices were received from the Immigration Officer at Quebec, Canada, that measles had occurred on board of twelve steamships prior to their arrival at Canadian ports,—the cases being landed at Dominion Quarantine, Grosse Isle,—and three notices were received from the United States Commissioner of Immigrants, at Philadelphia, Pa. These notices gave the names and destinations of immigrants on board intending to settle in Michigan. Copies of these notices, including the lists of the names of the immigrants, were made on blanks, designed in this office for this purpose, and promptly sent from this office to the health officers of the jurisdictions where the immigrants intended to settle.

The purpose of such action is to aid the local health officials in preventing outbreaks of dangerous communicable diseases, and, as a matter of fact, this method of forewarning the health officials of the localities where possibly infected immigrants are destined to settle has been productive of good results, and in recent years while these measures have been in use, very few outbreaks have been traced to immigrants.

During the year 1901 the following outbreaks were reported from jurisdictions where possibly infected immigrants were reported destined to settle which occurred at or near the date of their arrival, and where the contagium was not reported as traced to some other source, also outbreaks traced by local health officers to immigrants:

Immigrant notice was received of ten immigrants, possibly infected with measles, who landed May 13, from the steamship *Tunisian*, Liverpool, destined to settle in Ishpeming city, Marquette county. The health officer of Ishpeming reported two cases of measles, from June to July, traced to "Finland." Notice was also received of immigrants from this steamship destined to settle in Baraga village. Five fatal cases of measles, from June to July, were reported from there. No source of contagium reported. Four notices of immigrants landing at dates from June 26 to August 26, destined for Negaunee were received. The health officer reported eight cases of measles in that city, but no date nor source of contagium.

The source of contagium of an outbreak in Greenland township, Ontonagon county, was reported by the health officer to have been from "Liverpool, England,—Finnish immigrants exposed in transit." No immigrant notice was received of immigrants destined for here landing before August 26.

The health officer of Chesaning village, Saginaw county, reported the source of an outbreak, from December to February, 1902, to have been:

"Caught on a trans-Atlantic steamer by immigrants." No notice was received of immigrants destined to settle here, but notice was received of three immigrants to settle in East Saginaw, who landed in Philadelphia, December 5.

An outbreak in Felch township, Dickinson county, of three fatal cases of measles from Nov. 1 to Dec. 18, was traced to "Finland." No notice was received of immigrants destined to settle in that particular locality.

The reports of health officers throughout the State show that the great difficulty experienced in restricting this disease lies in the mistaken idea, so generally prevalent, that measles is not to be dreaded in childhood, but, rather, to be sought. And in mild cases no physician is employed, no reports made, and consequently, no effort made to prevent its spread. Many health officers state that their compensation is not sufficient to allow them to seek out all neglected cases, fumigate premises, and bring the offenders to justice. While in many instances this disease is very mild in character, there are many who suffer throughout life from the after effects of the disease. Consumption and other diseases of the respiratory organs, sometimes follow measles. Aside from the diseases induced by measles, and the trouble and suffering caused by so many cases of sickness from this disease, statistics show that the mortality from it warrants vigorous means for the prevention of its spread.

The State Board of Health, by its systems of widespread education, is making earnest efforts to instruct the people generally as to the character of this disease, that it is a dangerous communicable disease, and, as such, can be and ought to be restricted.

Estimated number of outbreaks and cases of measles prevented and lives saved by isolation and disinfection.—Tables 7 and 8 and the accompanying diagram compare the average numbers of cases and deaths in outbreaks of measles where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.* By Table 8 it may be seen that during the twelve years, 1890-1901, there were about sixteen times as many cases per outbreak in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By table 7 it may be seen that during the year 1901 there were reported to the office of the State Board of Health 350 outbreaks of measles with 5,025 cases, including 58 deaths.† Had no efforts at restriction been

* In the compilation of the reports for Tables 7 and 8 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and disinfection enforced." If, however, he neglects to properly isolate and disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed, "Isolation or disinfection or both not mentioned, or statements doubtful."

† *Definition of outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constitut-

made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed, "Isolation and disinfection both neglected," there would have occurred 7,382 cases, including 60 deaths, and taking from these respectively the cases (5,025), including deaths (58) which did occur, leaves 2,357 cases, including 2 deaths, indicated as prevented in these 350 outbreaks, by isolation and disinfection. By the same method for each year the indicated saving in the 5,553 outbreaks which occurred during the twelve years, 1890-1901, is 140,573 cases, including 1,133 lives. This is shown in table 8.

Period of incubation of measles.—The average of the 71 reported periods of incubation is about 10.8 days. The greatest number of cases in any one period was in the fourteen-day period. Further details are in Table 9.

TABLE 9.—*Exhibiting the reported period of incubation, stated in days, in 71 instances of measles. Compiled from reports of health officers in Michigan, for the year 1901.*

Incubation period—days	2	5	6	7	8	9	10	11	12	13	14	15	18	21
Cases in each period.....	1	*2	1	+8	‡4	\$10	¶15	2	14	**1	††18	‡‡3	1	§§1

* In 1 instance reported as about 5 days.

† In 3 instances reported as about 7 days.

‡ In 1 instance reported as about 8 days.

§ In 3 instances reported as about 9 days.

¶ In 9 instances reported as about 10 days.

‡ In 2 instances reported as about 12 days.

** In this instance reported as about 13 days.

†† In 7 instances reported as about 14 days.

‡‡ In 1 instance reported as about 15 days.

§§ In this instance reported as about 21 days.

Ages of greatest prevalence of, and mortality from measles.—The reports of local health officials in Michigan, for the year 1901, stated the ages of 1,854 persons who were sick with measles, including the ages of 50 persons who died of that disease.

There are two erroneous and very harmful beliefs, quite prevalent among parents,—that measles cannot ultimately be escaped any more than teething and that the least dangerous time for persons to have the disease is while quite young children. Whatever ground there may be for these beliefs elsewhere, reports to this office, as may be seen in tabulated form in Tables 10, 11, 12, 13, and 14, of this article, show that none exists in Michigan; but that, on the contrary, facts here bear evidence that measles is a preventable disease; and that it is *more* fatal to very young children than to persons in middle age.

Table 10 shows that for the year 1901, 64 per cent of all deaths from this disease was in children under five years of age. Table 11 shows that for a period of nine years, 1892-1900, 61 per cent of all deaths from measles was in children under five years old. Table 13 shows that by sex the distribution of deaths was about equal, 61.7 per cent of males and 63 per cent of females who died from measles, during the period of years, 1893-1900, were under five years old.

ing a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of *years* require that outbreaks be counted as closed, at the end of the *year*; while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to take *complete outbreaks*, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

The average age of decedents from measles in 1901 was 8.4 years for males and 10.6 years for females. For the period of years, 1893-1900, the average age of decedents was 7.9 years for males and 8.9 for females.

The average age of those who recovered from measles in 1901 was 10.9 years for males and 11.0 years for females. For the eight year period, the average age was 9.6 years for males and 9.8 years for females.

TABLE 10.—*Exhibiting in certain age-groups, the number of cases and the number of deaths from measles; the per cent that the cases in each group were of all cases of known ages, the per cent that the deaths in each group were of all deaths at known ages; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1901, which stated the ages.*

	Number and per cent of cases and deaths in certain age-groups.																																			
Ages in groups of years.	All ages known.	Under 1.					Under 5.					25-29.					35-39.					45-49.					55-59.					60 and over.				
		1.	2.	3.	4.		5-9.	10-14.	15-19.	20-24.		30-34.	40-44.	45-49.	50-54.	55-59.	60 and over.																			
No. of cases*.....	1,854	60	82	107	106	109	464	619	290	201	111	58	45	32	16	12	4	0	2																	
Per cent the cases in each group were of all cases of known ages...	100	3.2	4.4	5.8	5.7	5.9	25.0	33.4	15.6	10.8	6.0	3.1	2.4	1.7	.9	.6	.2	0	.1																	
No. of deaths*.....	50	15	6	7	2	2	32	7	1	3	1	0	0	2	1	2	0	0	1																	
Per cent the deaths in each group were of cases in that group.....	2.7	25.0	7.3	6.5	1.9	1.8	6.9	1.1	.3	1.5	.9	0	0	6.3	6.3	16.7	0	0	50																	
Per cent the deaths in each group were of all deaths at known ages...	100	30.0	12.0	14.0	4.0	4.0	64.0	14.0	2.0	6.0	2.0	0	0	4.0	2.0	4.0	0	0	2.0																	
Per cent the deaths in special groups were of all deaths at known ages...	64.0					78.0					10.0					0					10.0					0					2.0				

* Does not include those cases or deaths where the age was not stated.

TABLE 11.—*Exhibiting in certain age-groups, the number of cases and number of deaths from measles in the year 1901, and for the 9 years, 1892-1900; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths. (Compiled from all reports which stated the ages.)*

Year.		Total No. included.	Per cent of cases and deaths in certain age-groups.													
			All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.
1901.	Cases.....	1,854	100	25.0	33.4	15.6	10.8	6.0	3.1	2.4	1.7	.9	.6	.2	0	.1
	Deaths.....	50	100	64.0	14.0	2.0	6.0	2.0	0	0	4.0	2.0	4.0	0	0	2.0
1892-1900.	Cases.....	42,199	100	24.4	40.6	16.0	8.3	4.5	2.2	1.6	1.1	.6	.3	.1	.1	.1
	Deaths.....	672	100	61.0	12.8	6.8	6.0	3.0	3.3	1.8	1.9	1.5	.6	.4	.4	.4

202 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 12.—*Exhibiting, by sex, the per cent of persons in certain age-groups who recovered from measles, in Michigan, during the year 1901, and for the 8 years 1893-1900; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	No. of cases included.	Average age of persons who recovered—years.	Age.—In periods of years. Per cent of (non-fatal) cases in each period.													
				All ages.	Under five years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.
1901.	Males....	907	10.9	100	24.7	32.3	16.1	11.9	6.7	3.0	2.2	1.3	1.1	.4	.1	0	.1
	Females..	897	11.0	100	23.2	35.6	15.9	10.0	5.5	3.5	2.8	2.0	.6	.7	.3	0	0
1893-1900.	Males....	20,484	9.6	100	24.0	41.9	15.6	7.9	4.9	2.3	1.4	1.0	.5	.2	.1	.1	.1
	Females..	20,291	9.8	100	23.7	40.6	16.5	8.5	4.2	2.1	1.8	1.2	.7	.3	.2	.1	.1

TABLE 13.—*Exhibiting, by sex, the per cent of persons in certain age-groups who died of measles during the year 1901, and the averages for the eight years, 1893-1900.*

Year.	Sex.	Average age of decedents—years.	No. of deaths included.	Per cent of deaths in certain age-groups.											
				All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.	
1901.	Males.....	8.4	33	100	60.6	18.2	3.0	6.1	3.0	0	0	6.1	0	3.0	
	Females....	10.6	17	100	70.6	5.9	0	5.9	0	0	0	0	5.9	11.8	
1893-1900.	Males.....	7.9	300	100	61.7	14.3	6.0	7.3	3.7	2.7	.7	1.0	1.7	1.0	
	Females....	8.9	338	100	63.0	8.9	6.5	5.3	2.7	3.6	3.0	3.0	1.5	2.7	

Case-mortality rates from reported measles at the different ages.—For the reason explained previously in this article, the reports of deaths from measles since 1898, are probably accurate. This fact should be considered in reference to the case-mortality rates, or fatality, from measles, as shown in Table 14.

Great difficulty has been experienced in obtaining reports of cases of measles, and, while there has been much improvement each year in reports of this disease, a large number of the cases are not yet reported.

The total number of cases in which the ages were given, for the period of twelve years, 1890-1901, was 49,363 cases, of which number 771 were fatal cases,—giving a fatality, or case-mortality rate, for this period of years, of persons at all ages, of 1.6 deaths per 100 cases of measles.

Table 14 shows that the fatality from this disease for twelve years, 1890-1901, was greatest in children under one year of age; in children under five years of age the fatality was over seven times the fatality in children from five to nine years old, this having been the age-period of lowest fatality. The fatality generally having increased from this age-period up to old age, having been especially high after fifty-five years of age.

TABLE 14.—*In certain age-groups, the numbers of cases and deaths from measles in the 12 years, 1890-1901, and the per cent that the deaths in each group were of the cases in that group. (Compiled from all the reports to the Secretary of the State Board of Health for the years 1890-1901, which stated the ages.)*

	Under 1 year.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 and over.
Cases—1890-1901..	861	11,963	19,691	8,031	4,245	2,311	1,128	831	566	305	152	63	29	25	23
Deaths—1890-1901	154	465	102	49	49	24	22	14	16	12	8	2	3	2	3
Per cent.....	17.9	3.9	.5	.6	1.2	1.0	2.0	1.7	2.8	3.9	5.3	3.2	10.3	8.0	13.4

TABLE 15.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from measles, in Michigan, during the year 1901, and the averages for the 9 years, 1892-1900. Per cent of deaths arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of measles.												
Year.	Sex.	No. of deaths included.	Average duration.	Duration of sickness:—Per cent of deaths in each period of days.								
				All deaths.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 and over.
1901.	Males.....	16	11.8	100	18.8	37.5	12.5	6.3	18.8	6.3	0	0
	Females.....	10	6.6	100	50.0	40.0	0	10.0	0	0	0	0
1892-1900.	Males.....	157	9.4	100	34.4	36.9	10.2	12.1	1.9	3.8	0	.6
	Females.....	195	9.9	100	36.4	32.3	17.4	5.1	3.6	2.1	.5	2.6

TABLE 16.—*Exhibiting, by sex of patient, by per cent of cases which recovered in specified periods of time, the duration (in days) of non-fatal cases of sickness from measles in Michigan, during the year 1901, and the averages for the 9 years, 1892-1900. Per cent of cases arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-fatal cases of measles.																
Year .	Sex.	No. of cases in- cluded.	Average dura- tion.	Duration of sickness:—Per cent of cases in each period of days.												
				All periods.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over.
1901.	Males.....	630	13.3	100	6.7	33.8	33.3	11.9	8.6	3.3	1.1	.6	.2	.2	.2	.2
	Females.....	630	14.3	100	3.3	28.7	36.0	17.3	9.5	3.2	.6	.2	.3	.2	.2	.5
1892-1900.	Males	14,392	12.9	100	5.9	36.5	36.7	9.5	7.5	1.7	.9	.5	.4	.1	.1	.2
	Females.....	14,249	12.9	100	5.7	35.8	37.6	9.5	7.9	1.6	.7	.5	.3	.2	.1	.1

204 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 17.—*Measles in Michigan during the year 1901, exhibiting, by months, the per cent of all weekly card-reports received which stated the presence of measles; the average per cent of all observers reporting weekly who reported measles; the average order of prevalence of measles where it was present; the prevalence of measles, according to the sickness statistics, and the number of outbreaks of measles reported by health officers.*

1901.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Per cent of weekly card reports stating presence of measles.....	5	3	3	5	8	7	10	7	3	3	4	5	5
Average per cent of observers who reported measles present	9	8	5	10	12	14	14	16	4	5	6	6	10
Average order of prevalence where present.	2.5	4.8	2.8	2.7	1.9	2.1	2.3	2.9	2.0	2.7	2.0	1.8	1.9
Prevalence*.....	(8)	12	11	8	2	3	1	6	9	10	7	4	5
Outbreaks†.....	328	35	23	41	38	40	43	25	10	11	14	22	26

* According to the sickness statistics, as explained in the text accompanying this table. In the fourth line of figures in this table, the smallest numbers indicate the greatest prevalence.

† The numbers in this line show the numbers of outbreaks which began each month.

Average duration of measles. Fatal and non-fatal cases.—The average duration of fatal cases of sickness from measles during the years, 1892-1900, was 9.4 days for males and 9.9 days for females. The average duration of sickness from measles in non-fatal cases was 12.9 days for both sexes, for the period of nine years.

Proportion of measles in the different months of the year 1901.—Table 17 exhibits evidence, from two sources, on the proportion of measles reported in each month of the year 1901, namely, the sickness-statistics and the contagious-disease statistics. The *first* line states the per cent of all weekly postal-card reports, made by physicians in active general practice, which reported the presence of measles under their observation. The *second* line states the average per cent of all these reporters who stated the presence of measles. The *third* line states the average order of prevalence of measles in the list of diseases reported. The *fourth* line represents the *prevalence* of measles, according to the sickness-statistics, being a combination of the first and third lines of this table (the method of combining them is explained on pages 122-3 of the annual report of this Board for the year 1890). In this fourth line the smallest numbers indicate the greatest prevalence,—for instance, June is 1 or *first* in prevalence,—more measles in June than in any other month; April is 2 or *second* in prevalence; May is 3 or *third* in prevalence; and so on. The *fifth* line represents by months the number of outbreaks of measles reported to this office by health officers, including only the reports which gave the months in which the outbreaks began—reports of thirty-two outbreaks did not give dates.

The evidence of the sickness-statistics, summarized in the fourth line of this table (17) indicates that the maximum prevalence of measles in Michigan in 1901 occurred in June, and the minimum where sickness

was reported present was in January. The fifth line of the table, which is based on the contagious-disease statistics, indicates that the maximum number of reported outbreaks occurred in June and the minimum in August. This evidence is only for a single year, and might, therefore, be exceptional. In Table 14, in the article on sickness statistics on a preceding page of this annual report for 1902, is a statement of the average per cent of weekly card reports stating the presence of measles by months for the ten years, 1891-1900, from which it appears that the maximum occurs in May, and the minimum in September, October and November.

WHOOPING-COUGH IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1901.

During the year ending December 31, 1901, there were reported to the Secretary of the State Board of Health, 264 outbreaks of whooping-cough in 251 localities in Michigan, which resulted in 2,955 cases,* including 118 deaths.

Excluding Bay City, from which only the nine fatal cases were reported, and Detroit, from which only the sixteen fatal cases were reported, the average number of cases per locality, in 1901, was 11.77. The average number of deaths per locality was .47 of one death. Excluding Bay City and Detroit, the fatality from this disease, i. e., the proportion of cases which proved fatal, was 3.17 per cent, or about three deaths to 100 cases. If the fatality in Bay City and Detroit was the same as in the other parts of the State, the number of cases in these cities was 789; which if added to the 2,930 cases, the number of reported cases in the State exclusive of the twenty-five fatal cases in Bay City and Detroit, would have made 3,719 cases.

The death-rate from this disease for the State, according to the reports to this office, was .48 of one death per 10,000 inhabitants.

Whooping-cough in 1901 compared with previous years.—Table 1 shows that in 1901, as compared with the averages for the fourteen years, 1887-1900, the number of reported cases was 725 less and the reported deaths 8 more. The increase in the reported number of deaths may not indicate a greater fatality from this disease in 1901, but only that the fatal cases are being more frequently and carefully reported. There are still cases of whooping-cough in other parts of Michigan than Detroit which are not reported; in many instances the fatal cases, only, are reported and even not all fatal cases are yet reported to this office, as shown by the fact that for the year 1901 there were reported to the Secretary of State 154 deaths from whooping-cough, while only 118 were reported to the Secretary of the State Board of Health.

So far as relates to deaths, whooping-cough is of far greater importance to the people of Michigan than smallpox is, yet the reporting of the disease cannot be enforced because of the imperfect law on the subject. The legislature has been repeatedly asked to so amend the law as to have some competent authority decide what diseases are "dangerous to the public health" and therefore required to be reported; but thus far

* Throughout this article "cases" include deaths unless the word non-fatal is used.

206 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

the old imperfect law continues, and the diseases most dangerous to the public health cannot be restricted because they are not reported to the health officials.

TABLE 1.—Whooping-cough in Michigan in 1901, and the total and average for the 14 years 1887-1900. Exhibiting the numbers of reported cases and deaths and the number of localities in which the presence of the disease was reported, together with the cases and deaths per locality and per 100,000 inhabitants, and the per cent the deaths were of cases. (Compiled from reports received at the office of the Secretary of the State Board of Health.)

Years.	Cases.	Deaths.	Localities.	Cases per locality.	Deaths per locality.	Cases per 100,000 inhabitants.	Deaths per 100,000 inhabitants.	Per cent deaths were of cases.
1901	*2,955	118	251	†11.77	.47	†138.12	4.81	†3.17
Totals. 1887-1900	51,526	1,536	2,964	.....	.....	.....	.....	.....
Av. for 14 years...	3,680	110	213	17.27	.51	166	5.00	3.00

* In numerous instances only the fatal cases were reported to this office.

† Exclusive of Bay City, from which only the nine fatal cases were reported, and of Detroit, from which only the sixteen fatal cases were reported.

EXHIBIT 1.—Exhibiting the reported number of deaths from whooping-cough per 100,000 per ons living in Michigan in each of the 33 years, 1869-1901. (Compiled from the Secretary of State's Vital Statistics of Michigan. Population estimated by average annual increase.)

Year.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
Deaths (per 100,000, etc.)..	13.9	10.1	5.5	15.1	15.6	11.2	7.2	12.4	8.7	8.5	10.2	16.1	8.4	5.0
Year.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths (per 100,000, etc.)..	5.2	8.8	7.4	9.7	5.6	8.7	6.8	3.6	7.4	6.7	7.8	7.0	6.1	6.8
Year.	1897.	1898.	1899.	1900.	1901.									
Deaths (per 100,000, etc.)..	4.5	12.0	10.0	8.6	6.4									

Table 1, and comments thereon are based upon reports to the office of the State Board of Health. Exhibit 1, and comments thereon are based upon returns of deaths, made to the Secretary of State. For all years preceding 1898 the statistics of deaths were collected after the close of the year in which they occurred, and it is believed that not all deaths were reported; for all years after 1897 the deaths were recorded before burial, and returns were made to the Secretary of State early in the following month. There is reason to believe that under the new law nearly all deaths are included in the statistics, whereas before 1898 a

considerable proportion was omitted. This fact should be held in mind in comparing the deaths reported for the year 1901 with those reported in years previous to 1898, also in comparing the death-rate of 1898, 1899 and of 1900 with that for preceding years.

The statement of the death-rate for 1901 is based upon the ephemeral publication, the Bulletin of Vital Statistics; the final compilation of whooping-cough by the State Department Division of Vital Statistics in 1901 has not yet been completed, so that the death-rate stated may be changed later, because where two diseases are mentioned as causing death, as not infrequently occurs, not always the same one is used in the final compilation as in the Bulletin of Vital Statistics.

Distribution of whooping-cough by counties in Michigan during 1901.—Table 2 exhibits the distribution of whooping-cough by counties in this State during the year 1901, according to the reports made to the Secretary of the State Board of Health. The table shows the reported numbers of cases and deaths, also the sickness and death-rates from whooping-cough in each county from which the disease was reported.

Sickness and death-rates from reported whooping-cough.—Table 2 shows that the sickness-rate for the State, in 1901, was 13.81 cases per 10,000 population. This rate is exclusive of Detroit, from which only the sixteen fatal cases were reported,—with a population of 293,673, as estimated for 1901 by the health officer of the city.

The highest sickness-rate, by counties, was in Ogemaw county, where the rate was 317.77 cases per 10,000 population. There were 258 cases reported from this county, with a population of only 8,119.

By counties, the lowest sickness-rate, .21 of one case per 10,000 population, was in Jackson county, from which only one case was reported. Tuscola county, having a sickness-rate of .28 of one case per 10,000 population, and St. Clair county, .36 of one case per 10,000 population, had the next lowest sickness-rates.

Table 2 also shows that the death-rate for the State in 1901 was .48 of one death per 10,000 population.

The highest death-rate, by counties, was in Menominee county, 2.54 deaths per 10,000 population.

From twenty-six counties from which sickness from whooping-cough was reported there were no deaths reported from this disease.

The lowest death-rate, from counties from which deaths were reported, was in Kent county, .15 of one death per 10,000 population. St. Clair and Calhoun counties, having death-rates of .18 and .20 of one death per 10,000 population, were next lowest.

Whooping-cough in each month of the year, 1901.—From Table 3 it appears that the prevalence of whooping-cough is quite uniform throughout the year. A study of Table 14, of the article on "Sickness Statistics" in this report, shows that whooping-cough, according to the weekly card-reports made to this office, during the ten years, 1892-1901, varied but little in the different months; the *lowest* monthly average of reports which stated the presence of whooping-cough was 6 per cent of all reports received, while the *highest* monthly average was only 9 per cent. The general monthly average for the ten years was 7 per cent.

Source of contagium of whooping-cough and how the disease is spread.—Of the 2,955 cases of whooping-cough reported, during the year 1901, as exhibited in Table 4, the local health officers reported the source of contagium as follows: Traced to a former case, 444; from outside juris-

208 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

diction, 50; probably from outside jurisdiction, 8; unknown, 1,983; not stated or indefinitely reported, 470; total, 2,955.

TABLE 2.—Numbers of cases and deaths reported from whooping-cough per 10,000 persons living in each county in Michigan during the year 1901. (Compiled from reports of health officers.)

State and Counties.	Population of Michigan for 1901.*	Number of reported		Number per 10,000 population, of		Counties.	Population of Michigan for 1901.	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,450,872	12,930	118	13.81	.48	Keweenaw..	3,285	0	0	0	0
Alcona.....	5,736	0	0	0	0	Lake.....	4,799	0	0	0	0
Alger.....	6,613	0	0	0	0	Lapeer.....	27,434	63	1	22.96	.36
Allegan.....	38,748	43	0	11.10	0	Leelanau....	10,719	2	2	1.87	1.87
Alpena.....	18,343	0	0	0	0	Lenawee....	48,382	102	3	21.08	.62
Antrim.....	17,256	54	1	31.29	.58	Livingston...	19,534	0	0	0	0
Arenac.....	10,300	36	1	34.95	.97	Luce.....	3,088	0	0	0	0
Baraga.....	4,335	0	0	0	0	Mackinac....	7,780	2	0	2.57	0
Barry.....	22,815	148	0	66.33	0	Macomb.....	33,386	12	3	3.59	.90
Bay.....	62,556	130	12	14.80	1.92	Manistee....	28,145	2	0	.71	0
Benzie.....	9,953	0	0	0	0	Marquette....	41,776	33	0	7.90	0
Berrien.....	49,752	43	6	8.64	1.20	Mason.....	18,961	1	0	.52	0
Branch.....	28,077	159	2	56.63	.71	Mecosta.....	20,687	27	2	13.05	.97
Calhoun.....	49,621	51	1	10.28	.20	Menominee...	27,595	12	7	4.35	2.54
Cass.....	20,826	59	1	28.33	.48	Midland.....	14,642	14	0	9.56	0
Charlevoix...	14,337	30	0	20.92	0	Missaukee...	9,698	16	0	16.50	0
Cheboygan...	15,875	6	3	3.78	1.89	Monroe.....	32,682	15	0	4.59	0
Chippewa....	22,338	357	4	159.82	1.79	Monicarm....	32,519	48	7	14.76	2.15
Clare.....	8,423	3	1	3.55	1.19	Montmorency..	3,366	0	0	0	0
Clinton.....	24,947	103	2	41.29	.80	Muskegon....	36,988	24	2	6.49	.54
Crawford....	2,981	5	0	16.77	0	Newaygo.....	17,430	35	0	20.07	0
Delta.....	24,649	0	0	0	0	Oakland.....	45,144	14	0	3.10	0
Dickinson...	18,421	0	0	0	0	Oceana.....	16,651	50	0	30.03	0
Eaton.....	31,509	105	1	33.32	.32	Ogemaw.....	8,119	258	1	37.77	1.23
Emmet.....	16,854	19	0	11.27	0	Ontonagon....	6,083	10	0	16.44	0
Genesee.....	42,012	101	1	24.04	.24	Osceola.....	18,089	45	1	24.88	.55
Gladwin.....	6,840	21	0	30.70	0	Oscoda.....	1,412	0	0	0	0
Gowebic.....	17,180	1	1	.58	.58	Otsego.....	6,404	0	0	0	0
Gd. Traverse	20,972	5	2	2.38	.95	Ottawa.....	39,763	16	1	4.02	.25
Gratiot.....	30,074	13	0	4.32	0	Presque Isle..	9,304	1	0	1.07	0
Hillsdale...	29,796	44	1	14.77	.34	Roscommon...	1,808	4	0	22.12	0
Houghton...	69,708	81	6	11.62	.86	Saginaw.....	81,117	44	3	5.42	.37
Huron.....	33,479	0	0	0	0	Sanilac.....	35,239	2	0	.57	0
Ingham.....	39,839	23	1	5.52	.25	Schoolcraft...	8,015	0	0	0	0
Ionia.....	34,246	98	0	28.62	0	Shiawassee...	34,034	20	0	5.88	0
Iosco.....	9,896	0	0	0	0	St. Clair.....	55,378	2	1	.36	.18
Iron.....	9,605	0	0	0	0	St. Joseph....	23,688	6	1	2.53	.42
Isabella.....	23,007	90	3	39.11	1.30	Tuscola.....	36,135	1	0	.28	0
Jackson.....	48,502	1	0	.21	0	Van Buren....	33,641	71	5	21.11	1.49
Kalamazoo...	44,685	45	1	10.07	.22	Washtenaw...	48,469	71	1	14.05	.21
Kalkaska....	7,381	18	0	23.03	0	Wayne.....	358,179	1,107	23	13.97	.64
Kent.....	131,008	26	2	1.98	.15	Wexford.....	17,310	5	1	2.89	.58

* Population estimated by average annual increase.

† Exclusive of Bay City and Detroit, from which only the twenty-five fatal cases were reported.

‡ Exclusive of Bay City, from which only the nine fatal cases were reported.

§ Exclusive of Detroit, from which only the sixteen fatal cases were reported.

TABLE 3.—*Exhibiting the reported number of outbreaks of whooping-cough which were present, in each month of the year 1901, in the different local jurisdictions of Michigan.*

Months.....	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Outbreaks present.....	28	39	43	51	61	55	54	52	50	52	64	65

TABLE 4.—*Reported source of contagium of cases of whooping-cough, in 1901.*

Traced to a former case.....	444
Contagium reported as from outside jurisdiction.....	50
Contagium reported as probably from outside jurisdiction.....	8
Unknown or reports not definite (includes those reported "Contagium," "Sporadic," "Spontaneous," "De Novo," etc.).....	1,983
Not stated (including cases reported by registrars to Secretary of State and not reported to this office).....	470
All cases.....	2,955

Outbreaks of whooping-cough reported traced to previous outbreaks.—According to reports of local health officers in Michigan the contagium of whooping-cough in forty-five outbreaks, with an aggregate of 514 cases, including eight deaths, was traced to outside jurisdictions. From three of these second localities the contagium was permitted to spread to other localities resulting in twelve cases, including one death. Eight outbreaks were reported as *probably* traced to preceding outbreaks.

Ten outbreaks, with an aggregate of one hundred and forty-one cases, including three deaths, were traced to places outside of Michigan.

Transgression of the public health laws.—Strict isolation and disinfection enforced in the 257 outbreaks of whooping-cough would have lessened to a considerable degree the number of cases and deaths from the disease in 1901, and the carelessness on the part of the people generally approaches criminality. Such carelessness must be due to ignorance of the importance of the disease, for whooping-cough, for the past seven years, has caused more deaths in Michigan than either scarlet fever or measles,* and when this information has become sufficiently familiar to the people of the State, and the vital necessity of the isolation and disinfection of the disease is fully understood, then co-operation may be expected, and a diminution of the number of cases and deaths from whooping-cough may be expected.

The following quotations from reports of local health officers show some of the difficulties experienced by health officers in restricting this disease:—

"It is not possible here to do anything to prevent whooping-cough as people are not afraid of it. The disease is not reported to the health officer by parents or physicians."—*Dr. F. M. Goudy, Health Officer, St. Joseph, Berrien Co.*

"Physicians do not report their cases to the health officers, and often the cases do not come to the notice of the physicians excepting where there are complications."—*Dr. S. A. St. Amour, Health Officer, Cheboygan, Cheboygan Co.*

"It seems hard to get people to understand that 'only whooping-cough' is a dangerous dis-

* According to the returns made to the Secretary of State.

ease, and many cases have occurred that the physicians never heard of."—*Dr. William Blake, Health Officer, Lapeer, Lapeer Co.*

"Cases of whooping-cough are not reported and children having the disease are allowed to attend school."—*Dr. I. Ohlinger, Health Officer, Belding, Ionia Co.*

While some of the localities in the State, and a portion of the people, are in sympathy with the modern sanitary thought and the restriction of this disease, and while the conditions shown in the above quotations do not exist in every locality, still reports from various parts of the State show similar difficulties met by local health officers and physicians in restricting this disease.

Table 5 shows that of 257 outbreaks, in 137 of them isolation and disinfection were either not mentioned or the statements were so doubtful as to be impossible of classification; a majority of them were probably neglected; in four outbreaks disinfection was enforced and isolation was doubtful; in four outbreaks, isolation was enforced, but disinfection was doubtful; in ten outbreaks disinfection was enforced and isolation was neglected; in seven outbreaks isolation was enforced and disinfection was neglected; in eighty-three outbreaks isolation and disinfection were both neglected, and out of the 257 outbreaks reported, only twelve were reported as enforced. The results of the different modes of action are shown in Table 5.

Estimated number of outbreaks and cases of whooping-cough prevented and lives saved by isolation and disinfection.—Comparisons are made in Table 5, of the average numbers of cases and deaths in outbreaks of whooping-cough where the measures of isolation and disinfection prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in outbreaks where these measures were neglected.*

By this table (5) it may be seen that during the year 1901 there were reported to the office of the State Board of Health, 257† outbreaks of whooping-cough, with 2,957 cases, including 93 deaths. Had no efforts at restriction been made, and had the average number of cases and deaths per outbreak remained the same as in the column headed "Isolation and disinfection both neglected," there would have occurred 5,140 cases, including 131 deaths. Had the average numbers of cases and deaths in all outbreaks been the same as those in the column headed "Isolation and disinfection both enforced," there would have occurred only 493 cases, including 85 deaths, or 2,464 cases of sickness, including 8 deaths, from whooping-cough would have been prevented.

*In the compilation of the reports for Table 5 showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed, "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed, "Isolation and disinfection enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed, "Isolation or disinfection or both not mentioned; or statements doubtful."

†Whenever a break of sixty days or more has occurred in the progress of a communicable disease in a given township, village or city it has been regarded as two different outbreaks, but if the second appearance of the disease could be traced from the first the intermission was disregarded and it was treated as a single outbreak. Also, comparisons of years require that outbreaks be counted as closed at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains the apparent discrepancy between the number of outbreaks here given and the number given at the beginning of this article.

TABLE 5.—WHOOPING-COUGH IN MICHIGAN IN 1901: Exhibiting the average numbers of cases and deaths per outbreak:—(1) in all the 257 outbreaks reported; (2) in the 137 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 4 outbreaks in which disinfection was enforced and isolation doubtful; (4) in the 4 outbreaks in which isolation was enforced; (5) in the 10 outbreaks in which disinfection was enforced and isolation neglected; (6) in the 7 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 83 outbreaks in which isolation and disinfection were both neglected; (8) in the 12 outbreaks in which isolation and disinfection were both enforced.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
All outbreaks.	(257 outbreaks.)		(137 outbreaks.)		(4 outbreaks.)		(4 outbreaks.)		(10 outbreaks.)		(7 outbreaks.)		(83 outbreaks.)		(12 outbreaks.)	
Totals.....	2,967	93	1,189	37	20	2	6	1	43	6	13	1	1,660	42	23	4
Averages.....	11.51	.36	8.68	.27	5	.50	1.50	.25	4.30	.60	1.86	.14	20	.51	1.92	.33

212 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

Period of incubation in whooping-cough.—The average period of incubation in the twenty-three reported instances is thirteen days; the greatest number of instances given in any single period was in the fourteen-day period.

TABLE 6.—*Exhibiting the reported period of incubation, stated in days, in 23 instances of whooping-cough. Compiled from reports of health officers in Michigan, for the year 1901.*

Incubation period—days.....	*7	8	+9	‡10	12	§14	¶15	20	‡30
Instances in each period.....	3	1	3	4	1	6	1	3	1

* In 2 of these instances, reported as about 7 days. † In 1 of these instances, reported as about 9 days. ‡ In 2 of these instances, reported as about 10 days. § In 4 of these instances, reported as about 14 days. ¶ In this instance, reported as about 15 days. || In this instance, reported as about 30 days.

TABLE 7.—*Exhibiting in certain age-groups, the numbers of cases and deaths from whooping-cough, the per cent that the cases in each group were of all cases of known ages; the per cent that the deaths in each group were of all deaths at known ages; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1901, which stated the ages.*

Ages in groups of years.	Number and per cent of cases and deaths in certain age-groups.*														
	All known ages.	0-1.	1-2.	2-3.	3-4.	4-5.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.
No. of cases.....	692	112	70	57	67	75	381	211	75	12	3	1	5	1	2
Per cent the cases in each group were of all cases of known ages.....		16	10	8	10	11	55	30	11	2	.4	.1	.7	.1	.3
No. of deaths.....	113	70	25	5	1	7	108	4	0	0	0	0	0	0	1
Per cent the deaths in each group were of all cases in that group....	16	63	36	9	1	9	28	2	0	0	0	0	0	0	50
Per cent the deaths in each group were of all deaths, known ages.....		62	22	4	9	6	96	4	0	0	0	0	0	0	.9
Per cent the deaths in special groups were of all deaths, known ages.....		96					99					.9			

*Ages of greatest prevalence of, and mortality from whooping-cough.**—From table 7 it may be seen that eighty-five per cent of all the sickness, and ninety-nine per cent of all the deaths from whooping-cough occurred in children under ten years of age; that the fatality from this disease

* In dividing the ages into five-year periods, the first period includes all ages from birth to five years, or all under five years of age. The second five-year period includes all ages of five years and over and less than ten years. In each succeeding period the same arrangement is followed.
† Includes deaths from this disease.

was greatest in children under one year old—sixty-three per cent of the reported cases of that age having proved fatal; and, also, that sixty-two per cent of all deaths from this disease were in children under one year old.

TABLE 8.—*Exhibiting, by sex, the per cent of persons in certain age-groups who recovered from whooping-cough, in Michigan, during the year 1901; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of persons who recovered, years.	No. of cases included.	Age.—In periods of years. Per cent of (non-fatal) cases in each period.*										
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 and over.
1901.	Males.....	5.8	268	100	46	39	12	2	0	0	0	.4	.4	.4
	Females.....	6.1	311	100	48	33	14	2	1	.3	2	0	0	0

* On a preceding page, a foot-note to the side head under which this table appears, explains these age-groups.

Table 9 shows that all but two per cent of the reported deaths from whooping-cough, in which the ages were stated, were in children under ten years of age. Ninety-one per cent of the males and ninety-nine per cent of the females were under five years.

The average age of non-fatal cases of whooping-cough in 1901 was 5.8 years for males and 6.1 for females; for fatal cases the average age was 2.7 years for males and 1.1 for females.

TABLE 9.—*Exhibiting, by sex, the per cent of persons in certain age-groups who died of whooping-cough during the year 1901.*

Year.	Sex.	Average age of decedents.	No. of deaths included.	Per cent of deaths in certain age-groups.*				
				All ages.	Under 5.	5 to 9.	10 to 24.	25 to 39.
1901.	Males.....	2.7	46	100	91	7	0	0
	Females.....	1.1	67	100	99	1	0	0

* On a preceding page, a foot-note to the side head under which this table appears, explains these age-groups.

Duration of sickness from whooping-cough.—The duration of sickness from whooping-cough was given in 417 cases that recovered from this disease and in 53 fatal cases. Table 11 shows that the greatest per cent of non-fatal cases were sick from sixty-six to seventy days.

The average duration of non-fatal cases was 50.6 days for males and 43.7 days for females; for fatal cases the average duration was 23.4 days for males and 19.1 days for females.

The lesson of the experience may well be summed up in the constant warning advanced and persisted in by the State Board of Health,—

"Prevent the disease by isolation of the first cases, disinfect the sick room and all that comes in contact with the patient," and the number of cases will be lessened, the deaths from whooping-cough will be diminished.

TABLE 10.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from whooping-cough, in Michigan, during the year 1901. Per cent of deaths arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of whooping-cough.												
1901.	Year.	Sex.	No. of deaths in- cluded.	Duration of sickness:—Per cent of deaths in each period of days.								
				All periods.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 and over.
		Males.....	20	100	5	25	15	5	25	0	0	25
		Females.....	33	100	15	18	18	3	15	15	3	12

TABLE 11.—*Exhibiting, by sex of patient, the duration (in days) of non-fatal cases of sickness from whooping-cough, in Michigan, during the year 1901. Per cent of cases arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-fatal cases of whooping-cough.																	
Year.	Sex.	No. of cases in-cluded.	Duration of sickness: - Per cent of cases in each period of days.														
			All periods.	1 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.	61 to 65.	66 to 70.	71 to 75.	76 and over.
1901.	Males.....	201	100	6	6	3	2	6	11	9	6	4	7	9	17	5	10
	Females.....	216	100	6	6	5	4	4	7	14	9	12	5	5	16	8	8

SMALLPOX (VARIOLA) IN MICHIGAN IN 1901.

During the year ending December 31, 1901, there were reported to the Secretary of the State Board of Health, 620 outbreaks of smallpox in 449 localities in Michigan, which resulted in 5,088 cases, including thirty-one deaths. For the year 1900 there were reported to the Secretary of State the same number of deaths from smallpox, as were reported to this office.

The Monthly Bulletins of Vital Statistics show five deaths less from smallpox than were reported to this office, but as the final compilation in the office of the Secretary of State has not yet been completed, the deaths included in that may be the same as reported to this office.

Smallpox epidemic.—The mild but widespread epidemic of smallpox which has been prevalent in Michigan during the year 1901, is a part of the general widespread epidemic now prevalent in many sections of the United States. A marked characteristic of the disease existing in Michigan as in other States during the year 1901, has been its extreme mildness. This particular feature of the disease has been so marked, that in many instances delay in combating it has resulted, very greatly increasing the difficulty of restricting the spread of the disease. An evidence of the mildness of the disease is shown by the very low fatality in the State. In the year 1901 only thirty-one deaths have been reported to have occurred out of a total of 5,088 cases of sickness, which gives the exceedingly low fatality of .61 of one death per 100 cases.

TABLE 1.—*Exhibiting the estimated population of Michigan in each of the years 1892–1901 inclusive, the number of cases and deaths from smallpox in each year, and the death-rate each year.*

Year.	Population.	Cases.	Deaths.	Death-rate.
1892	2,185,279	1	1	.004
1893	2,204,563	10	3	.01
1894	* 2,241,454	285	60	.27
1895	2,278,579	185	47	.21
1896	2,315,517	28	16	.07
1897	2,352,455	15	0	.00
1898	2,389,393	32	1	.004
1899	2,426,331	139	6	.02
1900	† 2,420,982	649	9	.04
1901	‡ 2,450,872	5,088	31	.13

* State Census.

† U. S. Census.

‡ Population estimated by average annual increase (arithmetical method) based on State Census of 1894 and the U. S. Census of 1900. Computed in the office of the State Board of Health.

216 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 2.—Numbers of cases and deaths reported from smallpox per 10,000 persons living in each county in Michigan during the year 1901. (Compiled from reports of health officers, etc.)

State and counties.	Estimated population of Michigan for 1901.*	Number of reported.		Number per 10,000 population, of		Counties.	Estimated population of Michigan for 1901.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,450,872	5,088	31	20.76	.13	Keweenaw ..	3,285	7	0	21.31	0
						Lake.....	4,799	63	0	131.28	0
Alcona.....	5,736	31	0	54.04	0	Lapeer.....	27,434	13	0	4.74	0
Alger.....	6,613	26	0	39.32	0	Leelanau....	10,719	0	0	0	0
Allegan.....	38,748	14	0	3.61	0	Lenawee.....	48,382	10	1	2.07	.21
Alpena.....	18,343	0	0	0	0	Livingston...	19,534	2	0	1.02	0
Antrim.....	17,256	49	0	28.40	0	Luce.....	3,088	22	0	71.24	0
Arenac.....	10,300	4	0	3.88	0	Mackinac....	7,780	48	0	61.70	0
Baraga.....	4,335	13	0	29.99	0	Macomb.....	33,386	0	0	0	0
Barry.....	22,315	1	0	.40	0	Manistee.....	28,145	7	0	2.49	0
Bay.....	62,556	76	1	12.15	.15	Marquette...	41,776	32	1	7.76	.24
Benzie.....	9,953	26	0	26.12	0	Mason.....	18,961	35	0	18.45	0
Berrien.....	49,752	6	0	1.21	0	Mecosta.....	20,687	33	0	18.37	0
Branch.....	28,077	10	1	3.56	.36	Menominee...	27,595	46	0	16.67	0
Calhoun.....	49,629	132	0	26.60	0	Midland.....	14,642	88	0	60.10	0
Cass.....	20,826	3	0	1.44	0	Missaukee...	9,698	106	0	109.30	0
Charlevoix...	14,337	14	0	9.76	0	Monroe.....	32,682	1	0	.31	0
Cheboygan...	15,875	167	0	105.20	0	Montcalm....	32,519	57	0	17.53	0
Chippewa....	22,338	221	1	98.93	.45	Montmorency	3,366	3	0	8.91	0
Clare.....	8,423	170	1	201.83	1.19	Muskegon....	36,988	96	0	25.95	0
Clinton.....	24,947	78	0	31.27	0	Newaygo....	17,430	9	0	5.16	0
Crawford....	2,981	6	0	20.13	0	Oakland.....	45,144	27	0	5.98	0
Delta.....	24,649	74	2	30.02	.81	Oceana.....	16,651	187	0	112.30	0
Dickinson...	18,421	28	0	15.20	0	Ogemaw.....	8,119	13	0	16.01	0
Eaton.....	31,509	148	1	46.97	.32	Ontonagon...	6,083	1	0	1.64	0
Emmet.....	16,854	104	2	61.70	1.19	Osceola.....	18,089	143	1	79.05	.55
Genesee.....	42,012	68	1	16.19	.24	Oscoda.....	1,412	0	0	0	0
Gladwin.....	6,840	22	0	32.16	0	Otsego.....	6,404	27	0	42.16	0
Gogebie.....	17,180	17	0	9.89	0	Ottawa.....	39,763	0	0	0	0
Gd. Traverse.	20,972	27	2	12.87	.95	Presque Isle..	9,304	11	0	11.82	0
Gratiot.....	30,074	164	1	54.53	.33	Rosecommon..	1,808	0	0	0	0
Hillsdale....	29,796	41	0	13.76	0	Saginaw.....	81,117	529	4	65.21	.49
Houghton....	69,708	117	0	16.78	0	Sanilac.....	35,239	99	0	28.09	0
Huron.....	34,479	11	0	3.19	0	Schoolcraft..	8,015	68	0	84.72	0
Ingham.....	39,839	24	0	6.02	0	Shiawassee...	34,034	188	1	55.24	.29
Ionia.....	34,246	11	0	3.21	0	St. Clair.....	55,378	62	2	11.20	.36
Iosco.....	9,865	32	0	32.34	0	St. Joseph...	23,688	25	0	10.55	0
Iron.....	9,605	0	0	0	0	Tuscola.....	36,135	65	0	17.99	0
Isabella.....	23,007	494	2	21.47	.87	Van Buren...	33,641	84	3	24.97	.89
Jackson.....	48,502	7	0	1.44	0	Washtenaw..	48,469	10	0	2.06	0
Kalamazoo...	44,685	78	1	17.46	.22	Wayne.....	358,179	112	1	3.13	.03
Kalkaska....	7,381	20	0	27.10	0	Wexford.....	17,310	112	1	64.70	.58
Kent.....	131,008	108	0	8.24	0						

* Population estimated by average annual increase (arithmetical method) based on State Census of 1891 and the U. S. Census of 1901. Computed in the office of the State Board of Health.

In quite a number of instances it has been found necessary to send State Inspector, Dr. Geo. E. Ranney, to investigate outbreaks of smallpox. The report of the State Inspector has enabled this office to avail itself of the details of the outbreak visited, and has facilitated the work of combating the disease. This method, also, has proved an effective means of lessening the spread of the disease, by educating the people as to the necessity of prompt action, strict isolation of all infected persons and things, immediate and general vaccination, and after death or recovery of patients the thorough disinfection of all infected things.

Distribution of smallpox by counties during 1901.—The distribution by counties is shown in Table 2.

Smallpox in each month of the year 1901.—Sometimes the beginning of an outbreak is reported, but the exact time of the close of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. The last line of figures, in Table 3, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month.

TABLE 3.—*Exhibiting the reported number of outbreaks of smallpox which began, the number which ended, and the number of outbreaks which were present, in each month of the year 1901, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Number began.....	35	42	78	56	48	57	38	23	16	36	76	92	597
Number ended.....	10	22	39	54	44	69	56	40	22	20	28	60	464
Number present....	58	90	145	156	146	153	121	85	59	73	129	189	.....

TABLE 4.—*Exhibiting the number and per cent of localities from which the presence of smallpox was reported, the number and per cent of cases of smallpox present in Michigan in each month and the number and per cent of cases of smallpox taken sick in each month, during the year 1901. (Includes each case for which the time during which it existed was stated in the report. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Infected localities, number	53	83	134	142	134	149	123	84	58	70	118	170
Per cent.....	11.8	18.5	29.8	31.6	29.8	33.2	27.4	18.7	12.9	15.6	26.5	37.8
Cases present, number	184	305	630	759	756	549	442	256	220	264	586	947
Per cent.....	3.6	6	12.4	14.9	14.9	10.8	8.7	5.0	4.3	5.2	11.5	18.6
Cases taken sick, number..	148	233	476	502	483	375	286	143	146	226	508	738
Per cent.....	2.9	4.6	9.4	9.9	9.5	7.4	5.6	2.8	2.9	4.4	10	14.5

218 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

The total of the first line of figures in Table 4 exceeds the total infected localities (449), for the reason that some of the localities remained infected in more than one month. This results in making the total of the second line of figures, which state the per cent, exceed one hundred per cent.

The second line of figures in Table 4 shows the per cent the localities infected in each month are of the total number of infected localities (449) reported to this office for the year 1901.

The third line of figures in Table 4 shows the number of cases reported sick in any part of each month.

As some of the cases were sick longer than one month they are included in the cases sick in more than one month; therefore, the sum of the cases sick in all the months exceeds the total of reported cases (5,088) in 1901; and the sum of the fourth line of figures in Table 4 exceeds one hundred per cent.

The fourth and sixth lines of figures in this table show the per cent the cases present, and the per cent the cases taken sick, in each month are of the total number of cases (5,088) reported to this office for the year 1901.

TABLE 5.—*Reported source of contagium of cases of smallpox, in 1901.*

Traced to a former case.....	3,272
Contagium reported as from outside jurisdiction.....	469
Contagium reported as probably from outside jurisdiction.....	93
Unknown or reports not definite.....	1,020
Not stated.....	234
All cases.....	5,088

Of the 5,088 cases of smallpox reported, during the year 1901, as exhibited in Table 5, the local health officers reported the source of contagium as follows: Traced to a former case, 3,272; from outside jurisdiction, 469; probably from outside jurisdiction, 93; unknown, 1,020; not stated or indefinitely reported, 234; total, 5,088.

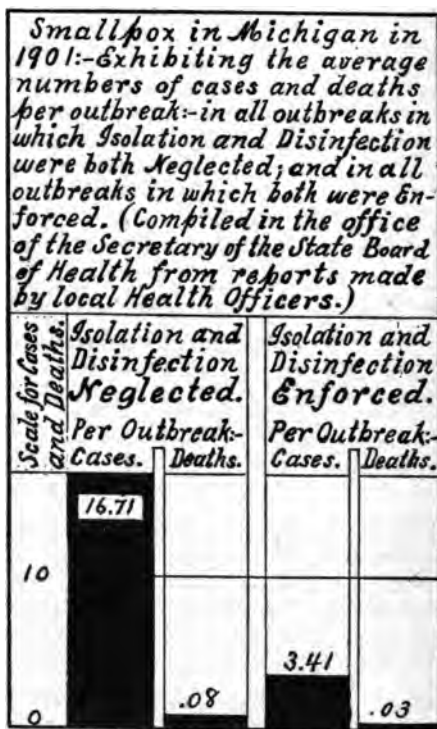
Estimated number of outbreaks and cases of smallpox prevented and lives saved by isolation and disinfection.—Comparisons are made in Table 6, of the average numbers of cases, including deaths, in outbreaks of smallpox where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases, including deaths, in outbreaks where these measures were neglected.*

* In the compilation of the reports for Table 6 showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed, "Isolation and disinfection both neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed, "Isolation and disinfection enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just was done, and they are obliged to place all such in the column headed, "Isolation or disinfection or both not mentioned; or statements doubtful."

TABLE 6.—SMALLPOX IN MICHIGAN IN 1901: Exhibiting the average numbers of cases and deaths per outbreak:—(1) in all the 608 outbreaks reported; (2) in the 107 outbreaks in which it is doubtful whether or not disinfection or isolation was enforced; (3) in the 26 outbreaks in which disinfection was enforced and isolation doubtful; (4) in the 41 outbreaks in which isolation was enforced and disinfection was doubtful; (5) in the 104 outbreaks in which disinfection was enforced and isolation neglected; (6) in the 5 outbreaks in which isolation was enforced and disinfection neglected; (7) in the 197 outbreaks in which isolation and disinfection were both enforced; (8) in the 129 outbreaks in which isolation and disinfection were both neglected.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	All outbreaks. (608 outbreaks.)		Isolation or disinfection or both not mentioned, or statements doubtful. (107 outbreaks.)		Disinfection enforced— isolation doubtful. (26 outbreaks.)		Isolation enforced— disinfection doubtful. (41 outbreaks.)		Disinfection enforced— isolation neglected. (104 outbreaks.)		Isolation enforced— disinfection neglected. (5 outbreaks.)		Isolation and disinfection both neglected. (197 outbreaks.)		Isolation and disinfection both enforced. (129 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals...	5,933	33	979	4	138	1	232	2	854	7	5	0	3,292	15	440	4
Averages	9.76	.05	9.15	.04	5.31	.04	5.66	.05	8.21	.07	1.00	0	16.71	.08	3.41	.03

ISOLATION AND DISINFECTION RESTRICT SMALLPOX.



[PLATE 1151]

The diagram [Plate 1151], on Isolation and Disinfection of Smallpox, exhibits graphically what has been accomplished in those outbreaks of smallpox in Michigan, in the year 1901, where isolation and disinfection have been enforced, compared with those outbreaks where isolation and disinfection have been neglected. An average of 16.71 cases with .08 of one death per outbreak has occurred in those outbreaks where isolation and disinfection have not been practiced, while an average of only 3.41 cases with .03 of one death per outbreak has resulted where isolation and disinfection have been enforced.

220 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 7.—*Exhibiting the reported period of incubation, stated in days, in 293 cases of smallpox. Compiled from reports of health officers in Michigan, for the year 1901.*

Incubation period— days.....	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	28	29	30	34
Cases in each period	1	*4	1	†1	‡13	§3	*14	‡9	2	**33	††12	‡‡96	§§19	8	4	††16	2	6	||16	2	5	1	1	2	1	1

* In one instance about 3 days.

† In one instance about 5 days.

‡ In two instances about 7 days.

§ In one instance about 8 days.

* In four instances about 9 days.

‡ In thirteen instances about 10 days.

** In seventeen instances about 12 days.

†† In two instances about 13 days.

‡‡ In thirty-six instances about 14 days.

§§ In three instances about 15 days.

†† In one instance about 18 days.

|| In two instances about 21 days.

TABLE 8.—*Exhibiting in certain age-groups, the number of cases and the number of deaths from smallpox; the per cent that the cases in each group were of all cases of known ages, the per cent that the deaths in each group were of all deaths at known ages; and the per cent that the deaths in each group were of the cases in that group. Compiled from all reports for the year 1901, which stated the ages.*

	Number and per cent of cases and deaths in certain age-groups.																			
Ages in groups of years.	All ages known.	Under 1.	1.	2.	3.	4.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	60 and over.	
No. of cases*,....	2836	41	46	51	69	68	275	343	313	403	409	335	252	167	141	88	65	36	69	
Per cent the cases in each group were of all cases of known ages....	....	1.4	1.6	1.8	2.4	2.4	9.3	12.1	11.0	14.2	14.4	11.8	7.1	5.5	4.9	3.1	2.3	1.3	2.4
No. of deaths*,....	25	2	1	0	0	1	4	1	0	0	5	2	1	2	3	2	0	0	5	
Per cent the deaths in each group were of cases in that group.....	.9	4.9	2.2	0	0	1.5	1.5	.3	0	0	1.2	.6	.5	1.2	2.1	2.3	0	0	7.2	
Per cent the deaths in each group were of all deaths, at known ages.....	....	8	4	0	0	4	16	4	0	0	20	8	4	8	12	8	0	0	20
Per cent the deaths in special groups were of all deaths, known ages.....	....	16.0					20			40.					40.				

* Does not include those cases or deaths where the age was not stated.

Table 6 shows that of 608 outbreaks, in 107 of them isolation and disinfection were either not mentioned or the statements were so doubtful as to be impossible of classification; a majority of them were probably neglected; in 26 outbreaks disinfection was enforced and isolation was doubtful; in 41 outbreaks, isolation was enforced, but disinfection was doubtful; in 104 outbreaks disinfection was enforced and isolation was neglected; in 5 outbreaks isolation was enforced and disinfection was

neglected; in 197 outbreaks isolation and disinfection were both neglected, and out of the 608 outbreaks reported, 129 were reported as enforced. The results of the different modes of action are shown in Table 6.

By this table (6) it may be seen that during the year 1901 there were reported to the office of the State Board of Health, 608* outbreaks of smallpox, with 5,933 cases, including 33 deaths. Had no efforts at restriction been made, and had the average number of cases and deaths per outbreak remained the same as in the column headed "Isolation and disinfection both neglected," there would have occurred 10,160 cases, including 49 deaths. Had the average number of cases and deaths in all outbreaks been the same as those in the column headed "Isolation and disinfection both enforced," there would have occurred only 2,073 cases, including 18 deaths, or 3,860 cases of sickness, including 15 deaths, from smallpox would have been prevented.

The average period of incubation of smallpox in the 293 cases is 14 days.

TABLE 9.—*Exhibiting by sex, the number of persons in certain age-groups, who recovered from smallpox, and the per cent of cases by age-groups who recovered from smallpox, in Michigan, in 1901, also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of non-fatal cases, years.	No. of cases included.	Age.—In periods of years. Number of (non-fatal) cases in each period of age.										
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.
1901.	Males	23.5	1,705	.....	143	176	151	237	278	229	134	114	77	105
	Females	20.5	1,106	.....	118	166	162	166	125	104	67	51	61	85
	Percent the non-fatal males in each age-group were of the total non-fatal males..			100	8.4	10.3	8.9	13.9	16.3	13.4	7.9	6.7	4.5	9.7
	Per cent the non-fatal females in each age-group were of the total non-fatal females			100	10.7	15.0	14.6	15.0	11.4	9.4	6.1	4.6	5.5	7.7

TABLE 10.—*Exhibiting, by sex of patient, the duration (in days) of non-fatal† cases of sickness from smallpox, in Michigan, during the year 1901.* Per cent of cases arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

†Non-fatal cases of smallpox.																	
Year.	Sex.	No. of cases included.	Duration of sickness:—Per cent of cases in each period of days.														
			All periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.	61 to 65.	66 and over.
1901.	Males	1,252	100	4.3	11.1	19.9	20.9	18.3	11.0	6.5	4.6	1.3	1.1	.2	.4	.3	.2
	Females	805	100	5.8	15.8	19.3	18.5	16.9	9.4	8.2	3.5	1.1	1.5	0	0	0	0

* See foot-note on page 225.

† There were but fourteen fatal cases which stated the duration of sickness.

222 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 11.—*Exhibiting the localities, by counties, in Michigan, arranged alphabetically, at which smallpox was reported present during the year 1901, and the numbers of cases and deaths occurring in each locality.*

Counties.	Localities.	Cases.	Deaths.	Counties.	Localities.	Cases.	Deaths.
Alcona.....	Curtis Tp.....	31	0	Charlevoix.....	Chandler Tp.....	9	0
	Burt Tp.....	4	0		Charlevoix Vil.....	1	0
	Limestone Tp.....	4	0		Marion Tp.....	3	0
Alger.....	Munising Tp.....	2	0		Melrose Tp.....	1	0
	Munising Vil.....	15	0		Benton Tp.....	27	0
	Rock River Tp.....	1	0		Burt Tp.....	11	0
	Fennville Vil.....	1	0		Cheboygan city.....	67	0
Allegan.....	Ganges Tp.....	3	0		Forest Tp.....	1	0
	Martin Tp.....	9	0		Grant Tp.....	5	0
	Watson Tp.....	1	0	Cheboygan.....	Hebron Tp.....	1	0
	Central Lake Vil.....	4	0		Inverness Tp.....	47	0
	Elk Rapids Tp.....	3	0		Mackinac Vil.....	1	0
	Kearney Tp.....	2	0		Mentor Tp.....	1	0
Antrim.....	Mancelona Vil.....	17	0		Munro Tp.....	1	0
	Mancelona Tp.....	8	0		Waverly Tp.....	5	0
	Star Tp.....	1	0		Bruce Tp.....	30	0
	Warner Tp.....	14	0		Dafters Tp.....	3	0
	Arenac Tp.....	1	0		DeTour Vil.....	2	1
Arenac.....	Lincoln Tp.....	1	0		Pickford Tp.....	20	0
	Standish Tp.....	2	0	Chippewa.....	Sault Ste. Marie city	101	0
	Arvon Tp.....	4	0		Sault Ste. Marie Tp.....	6	0
Baraga.....	Baraga Vil.....	3	0		Sugar Island Tp.....	3	0
	L'Anse Vil.....	6	0		Superior Tp.....	28	0
Barry.....	Hastings city.....	1	0		Trout Lake Tp.....	8	0
	Bangor Tp.....	4	0		Whitefish Tp.....	20	0
	Bay City.....	22	0		Arthur Tp.....	14	0
	Essexville Vil.....	3	0		Clare city.....	47	0
	Fraser Tp.....	1	0		Farwell Vil.....	6	0
	Garfield Tp.....	1	0		Garfield Tp.....	2	0
Bay.....	Kawkawlin Tp.....	1	0		Grant Tp.....	16	1
	Monitor Tp.....	6	0		Hamilton Tp.....	6	0
	Pinconning Tp.....	3	1	Clare.....	Harrison city.....	4	0
	Pinconning Vil.....	4	0		Hatton Tp.....	10	0
	West Bay City.....	30	0		Redding Tp.....	21	0
	Williams Tp.....	1	0		Sheridan Tp.....	25	0
	Benzonia Tp.....	12	0		Summerfield Tp.....	9	0
	Benzonia Vil.....	2	0		Surrey Tp.....	5	0
	Colfax Tp.....	2	0		Winterfield Tp.....	5	0
Benzie.....	Crystal Lake Tp.....	1	0		Duplain Tp.....	10	0
	S. Frankfort Vil.....	3	0		Eagle Tp.....	7	0
	Thompsonville Vil.....	6	0		Eagle Vil.....	1	0
	Coloma Vil.....	1	0	Clinton.....	Elsie Vil.....	36	0
Berrien.....	Oronoka Tp.....	1	0		Lebanon Tp.....	2	0
	Royalton Tp.....	4	0		Maple Rapids Vil.....	2	0
	Coldwater city.....	7	0		St. Johns Vil.....	10	0
Branch.....	Gilead Tp.....	1	0		Victor Tp.....	10	0
	Quincy Tp.....	2	1	Crawford.....	Grayling Tp.....	6	0
	Battle Creek city.....	8	0		Baldwin Tp.....	1	0
	Burlington Tp.....	1	0		Bay De Noc Tp.....	17	2
	Clarendon Tp.....	2	0		Escanaba city.....	18	0
	Eckford Tp.....	19	0		Escanaba Tp.....	1	0
	Emmet Tp.....	2	0	Delta.....	Garden Vil.....	10	0
	Fredonia Tp.....	10	0		Gladstone city.....	4	0
Calhoun.....	Homer Tp.....	5	0		Masonville Tp.....	1	0
	Homer Vil.....	1	0		Nahma Tp.....	6	0
	Lee Tp.....	2	0		Sack Bay Tp.....	15	0
	Marengo Tp.....	25	0		Wells Tp.....	1	0
	Marshall city.....	39	0		Breen Tp.....	15	0
	Newton Tp.....	14	0	Dickinson.....	Felch Tp.....	2	0
	Tekonsha Tp.....	4	0		Iron Mountain city.....	5	0
	Penn Tp.....	1	0		Sagola Tp.....	5	0
Cass.....	Volinia Tp.....	2	0		Waucedah Tp.....	1	0
					Bellevue Tp.....	10	1
					Brookfield Tp.....	5	0
					Delta Tp.....	18	0
					Eaton Rapids Tp.....	2	0
				Eaton.....	Grand Ledge city.....	65	0
					Kalamo Tp.....	23	0
					Olivet Vil.....	2	0
					Roxand Tp.....	14	0
					Windsor Tp.....	9	0

TABLE 11.—CONTINUED.

Counties.	Localities.	Cases.	Deaths.	Counties.	Localities.	Cases.	Deaths.
Emmet.....	Bear Creek Tp.....	1	0	Isabella.....	Bloomfield Tp.....	4	0
	Carp Lake Tp.....	34	1		Chippewa Tp.....	2	0
	Center Tp.....	1	0		Coe Tp.....	25	0
	Egleston Tp.....	21	0		Deerfield Tp.....	22	0
	Harbor Springs Vil..	1	0		Denver Tp.....	18	2
	Littlefield Tp.....	9	0		Fremont Tp.....	3	0
	Little Traverse Tp..	1	0		Gilmore Tp.....	161	0
	Maple River Tp.....	9	0		Isabella Tp.....	6	0
	Petoskey city.....	13	0		Lincoln Tp.....	11	0
	Resort Tp.....	14	1		Mt. Pleasant city..	58	0
Genesee.....	Burton Tp.....	1	0	Jackson.....	Nottawa Tp.....	70	0
	Clio Vil.....	1	0		Rolland Tp.....	8	0
	Flint city.....	65	1		Shepherd Vil.....	9	0
	Flint Tp.....	1	0		Union Tp.....	10	0
Gladwin.....	Billings Tp.....	4	0	Kalamazoo.....	Vernon Tp.....	22	0
	Butman Tp.....	5	0		Wise Tp.....	15	0
	Grant Tp.....	2	0		Blackman Tp.....	2	0
	Sherman Tp.....	4	0		Jackson city.....	5	0
Gogebic.....	Tobacco Tp.....	7	0	Kalamazoo.....	Comstock Tp.....	6	1
	Watersmeet Tp.....	17	0		Kalamazoo city.....	67	0
G'd Traverse...	Acme Tp.....	3	1		Portage Tp.....	2	0
	Fife Lake Vil.....	1	0		Richland Tp.....	3	0
	Grant Tp.....	2	0	Kalkaska.....	Garfield Tp.....	8	0
	Green Lake Tp.....	14	0		Kalkaska Tp.....	2	0
	Traverse city.....	1	0		Kalkaska Vil.....	2	0
	Whitewater Tp.....	6	1		Rapid River Tp.....	8	0
Gratiot.....	Alma Vil.....	36	0	Kent.....	Ada Tp.....	10	0
	Arcada Tp.....	14	0		Courtland Tp.....	2	0
	Ashley Vil.....	6	0		Grand Rapids city..	41	0
	Elba Tp.....	8	0		Grand Rapids Tp..	1	0
	Fulton Tp.....	5	1	Kent.....	Grandville Vil.....	7	0
	Ithaca Vil.....	1	0		Lowell Vil.....	1	0
	Lafayette Tp.....	3	0		Sand Lake Vil.....	7	0
	New Haven Tp.....	2	0		Solon Tp.....	2	0
	North Shade Tp.....	4	0	Kent.....	Sparta Tp.....	15	0
	Pine River Tp.....	14	0		Spencer Tp.....	6	0
	Seville Tp.....	57	0		Tyrone Tp.....	6	0
	Sumner Tp.....	10	0		Vergennes Tp.....	1	0
	Wheeler Tp.....	4	0		Wyoming Tp.....	9	0
Hillsdale.....	Adams Tp.....	21	0	Keweenaw....	Allouez Tp.....	5	0
	Pittsford Tp.....	11	0		Houghton Tp.....	2	0
	Wheatland Tp.....	9	0	Lake.....	Baldwin Vil.....	9	0
	Calumet Tp.....	64	0		Chase Tp.....	15	0
Houghton.....	Chassell Tp.....	4	0		Dover Tp.....	10	0
	Franklin Tp.....	1	0		Lake Tp.....	11	0
	Houghton Vil.....	1	0		Pinora Tp.....	2	0
	Laird Tp.....	8	0		Pleasant Plains Tp..	16	0
	Lake Linden Vil...	1	0	Lapeer.....	Dryden Tp.....	6	0
	Laurium Vil.....	23	0		Oregon Tp.....	7	0
	Osceola Tp.....	6	0	Lenawee.....	Hudson city.....	4	0
	Quincy Tp.....	6	0		Hudson Tp.....	3	1
Huron.....	Red Jacket Vil.....	2	0		Palmyra Tp.....	1	0
	Torch Lake Tp.....	1	0		Raisin Tp.....	1	0
	Chandler Tp.....	1	0		Rollin Tp.....	1	0
Ingham.....	Dwight Tp.....	1	0	Livingston....	Conway Tp.....	1	0
	Hume Tp.....	9	0		Howell Vil.....	1	0
	Lansing city.....	12	0	Luce.....	McMillan Tp.....	3	0
Ionia.....	Lansing Tp.....	12	0		Newberry Vil.....	19	0
	Danby Tp.....	1	0	Mackinac.....	Garfield Tp.....	9	0
	Keene Tp.....	7	0		Mackinac Island city	1	0
	Lake Odessa Vil...	1	0		Moran Tp.....	15	0
	Otisco Tp.....	1	0		Newton Tp.....	8	0
Iosco.....	Ronald Tp.....	1	0		St. Ignace city.....	15	0
	Baldwin Tp.....	1	0	Manistee.....	Cleon Tp.....	1	0
	East Tawas city...	26	0		Manistee city.....	5	0
	Oscoda Vil.....	1	0		Onkama Tp.....	1	0
	Tawas City.....	2	0				
	Tawas Tp.....	2	0				

224 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

TABLE 11.—CONTINUED.

Counties.	Localities.	Cases.	Deaths.	Counties.	Localities.	Cases.	Deaths.
Marquette	Champion Tp.....	2	0	Oceana	Elbridge Tp.....	78	0
	Forsyth Tp.....	1	0		Golden Tp.....	6	0
	Ishpeming city.....	13	0		Hart Tp.....	20	0
	Ishpeming Tp.....	4	0		Hart Vil.....	35	0
	Marquette city.....	7	0		Leavitt Tp.....	15	0
	Michigamme Tp.....	0	1		Newfield Tp.....	3	0
Mason	Negaunee Tp.....	5	0	Ogemaw	Weare Tp.....	30	0
	Branch Tp.....	1	0		Churchill Tp.....	13	0
	Custer Tp.....	17	0		Rockland Tp.....	1	0
	Custer Vil.....	1	0		Evart Tp.....	14	0
	Ludington city.....	3	0		Evart Vil.....	11	0
	Riverton Tp.....	1	0		Hartwick Tp.....	19	0
Mecosta	Sherman Tp.....	8	0	Osceola	Lincoln Tp.....	1	0
	Victory Tp.....	4	0		Marion Vil.....	13	0
	Austin Tp.....	1	0		Marion Tp.....	2	0
	Big Rapids city.....	1	0		Middle Branch Tp.....	23	0
	Fork Tp.....	6	0		Orient Tp.....	12	0
	Hinton Tp.....	11	0	Otsego	Reed City Vil.....	10	0
Menominee	Martiney Tp.....	2	0		Richmond Tp.....	3	0
	Melbrook Tp.....	17	0		Sylvan Tp.....	35	1
	Menominee city.....	21	0		Charlton Tp.....	12	0
	Meyer Tp.....	17	0		Corwith Tp.....	7	0
	Nadeau Tp.....	7	0		Dover Tp.....	8	0
	Spalding Tp.....	1	0	Presque Isle	Krakow Tp.....	1	0
Midland	Edenville Tp.....	2	0		Millersburg Vil.....	10	0
	Greendale Tp.....	6	0		Birch Run Tp.....	7	0
	Homer Tp.....	5	0		Brady Tp.....	7	0
	Jaspas Tp.....	30	0		Brant Tp.....	10	0
	Lee Tp.....	3	0		Bridgeport Tp.....	28	0
	Midland city.....	29	0	Saginaw	Buena Vista Tp.....	13	0
Missaukee	Midland Tp.....	11	0		Chapin Tp.....	9	0
	Mt. Haley Tp.....	2	0		Chesaning Vil.....	28	1
	Caldwell Tp.....	8	0		Chesaning Tp.....	7	0
	Forest Tp.....	11	0		Frankenmuth Tp.....	9	0
	Lake City Vil.....	17	0		Fremont Tp.....	14	0
	Lake Tp.....	7	0	Sanilac	Maple Grove Tp.....	5	1
Monroe	Norwich Tp.....	42	0		Marion Tp.....	27	0
	Pioneer Tp.....	1	0		Saginaw city.....	225	1
	Reeder Tp.....	2	0		Spaulding Tp.....	10	0
	West Branch Tp.....	18	0		St. Charles Tp.....	46	0
	Milan Tp.....	1	0		St. Charles Vil.....	50	1
	Bloomer Tp.....	3	0		Swan Creek Tp.....	18	0
Montcalm	Carson City.....	19	0	Sanilac	Taymouth Tp.....	11	0
	Crystal Tp.....	7	0		Tittabawassee Tp.....	6	0
	Douglas Tp.....	7	0		Custer Tp.....	2	0
	Evergreen Tp.....	2	0		Deckerville Vil.....	13	0
	Maple Valley Tp.....	2	0		Delaware Tp.....	10	0
	Reynolds Tp.....	1	0		Fremont Tp.....	6	0
Montmorency	Richland Tp.....	16	0	Schoolcraft	Marion Tp.....	49	0
	Albert Tp.....	1	0		Sanilac Center Vil.....	1	0
	Briley Tp.....	1	0		Washington Tp.....	2	0
	Vienna Tp.....	1	0		Wheatland Tp.....	16	0
	Casnovia Tp.....	5	0		Doyle Tp.....	9	0
	Cedar Creek Tp.....	5	0	Shiawassee	Germfast Tp.....	5	0
Muskegon	Fruitland Tp.....	1	0		Harrison Tp.....	13	0
	Holton Tp.....	10	0		Hiawatha Tp.....	5	0
	Muskegon city.....	59	0		Manistique city.....	30	0
	Muskegon Tp.....	5	0		Manistique Tp.....	1	0
	Muskg'n H'gts Vil.....	6	0		Thompson Tp.....	5	0
	North Muskegon.....	5	0	Shiawassee	Bancroft Vil.....	2	0
Newaygo	Home Tp.....	9	0		Bennington Tp.....	4	0
	Pontiac city.....	22	0		Caledonia Tp.....	7	0
Oakland	Rochester Vil.....	1	0		Durand Vil.....	9	0
	Waterford Tp.....	2	0		Fairfield Tp.....	36	0
	West Bloomfield Tp.....	2	0		Lansburg Vil.....	1	0
					Morrice Vil.....	2	0
					New Haven Tp.....	1	0
					Owosso city.....	42	0
					Rush Tp.....	75	1
					Sciota Tp.....	1	0
					Shiawassee Tp.....	4	0
					Vernon Tp.....	4	0

TABLE 11.—CONCLUDED.

Counties.	Localities.	Cases.	Deaths.	Counties.	Localities.	Cases.	Deaths.
St. Clair.....	Brockway Tp.....	16	1	Van Buren.....	Arlington Tp.....	3	0
	China Tp.....	2	0		Bangor Tp.....	60	1
	Emmet Tp.....	3	0		Hamilton Tp.....	1	0
	Greenwood Tp.....	3	0		Hartford Tp.....	15	1
	Kenoskee Tp.....	16	0		Paw Paw Vil.....	1	0
	Kimball Tp.....	9	1		South Haven Vil.....	4	1
	Linn Tp.....	1	0	Washtenaw....	Ann Arbor city.....	5	0
	Marine City Vil.....	3	0		Dexter Vil.....	1	0
	Mussey Tp.....	3	0		Northfield Tp.....	4	0
	Port Huron city.....	0	0	Wayne.....	Detroit.....	105	1
St. Joseph.....	Yale Vil.....	7	0		Monguagon Tp.....	2	0
	Burr Oak Tp.....	2	0		Wyandotte city.....	5	0
	Burr Oak Vil.....	13	0	Wexford.....	Boone Tp.....	9	0
	Constantine Vil.....	1	0		Cadillac city.....	27	0
	Constantine Tp.....	3	0		Cedar Creek Tp.....	2	0
	Three Rivers city.....	6	0		Clam Lake Tp.....	7	0
Tuscola.....	Almer Tp.....	6	0		Harrietta Vil.....	10	0
	Arbela Tp.....	5	0		Harring Tp.....	5	0
	Columbus Tp.....	13	0		Selma Tp.....	12	0
	Elmwood Tp.....	28	0		Slagle Tp.....	10	0
	Kingston Tp.....	5	0		Springville Tp.....	22	1
	Reese Vil.....	2	0		Wexford Tp.....	8	0
	Tuscola Tp.....	6	0				

Ages of greatest prevalence of, and mortality and fatality from smallpox in 1901.—Table 8 shows the proportion of sickness and deaths, and the fatality, from smallpox, by age-groups. Table 9 shows the proportion of non-fatal cases of sickness from smallpox, by age-groups.

Average age.—The ages of twenty-five fatal cases of smallpox were reported for 1901. The average age of these being 35.2 years for males and 31.7 years for females. The average age of non-fatal cases was 23.5 years for males and 20.5 years for females.

Average duration.—Table 10 shows the duration of sickness of non-fatal cases of smallpox in 1901. The average duration of non-fatal cases was 20.3 for males and 19 for females. The duration of sickness of decedents was reported in but fourteen instances. Of these the duration was 13.9 for males and 13.2 for females.

Movements of contagium of smallpox.—Table 12, "Movements of Contagium," shows the source and direction of movements of smallpox in Michigan, where the contagium was reported by health officers to have been introduced into their jurisdictions from localities outside the State, or from other jurisdictions within the State. Table 12 is so long that there is not room for it in this volume, which is restricted by law to not to exceed three hundred pages. Smallpox being one of the least important of the dangerous communicable diseases, and its modes of spreading being best known, this table is not printed. The map, printed herewith, exhibits some of the facts, more fully set forth in the table which is pre-

[Foot-note from page 221.]

† Whenever a break of sixty days or more has occurred in the progress of a communicable disease in a given township, village or city it has been regarded as two different outbreaks, but if the second appearance of the disease could be traced from the first the intermission was disregarded and it was treated as a single outbreak. Also, comparisons of *years* require that outbreaks be counted as closed at the end of the *year*; while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to take *complete outbreaks*, even where they extend from one year into the next. This explains the apparent discrepancy between the number of outbreaks here given and the number given at the beginning of this article.

226 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

served for future study. As examples of how the contagium is sometimes spread from locality to locality, as reported by local health officers,—from Boyne Falls village, Charlevoix county, the contagium was allowed to spread from locality to locality, aggregating in all localities so infected twenty-six outbreaks with 286 cases. In Sault Ste. Marie city, where the disease was introduced from Canada, there were 101 cases. From there

EXTRACT FROM TABLE 12.—*Movement*

First localities from which smallpox was spread.			Second localities infected from First.			Third localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Canada.....			Chippewa county: Sault Ste. Marie city... (Jan.—July 21.)	101	0	Alger county: Munising village..... (Mar. 13—April 27.)	1	0
						Chippewa county: Bruce township... (Jan.—April 13.)	20	0
						Detour village..... (May 15—June 28.)	2	0
						Sugar Island township (May 12—July 9.)	3	0
						Whitefish township... (April 28—June 7.)	20	0
						Mackinac county: Newton township.... (April 25—May 15.)	1	0

the contagium was allowed to spread to six localities, and from three of those to four others, and from locality to locality, resulting in sixteen outbreaks with 138 cases. Had the contagium been restricted in the first instance at Sault Ste. Marie these later outbreaks would have been avoided. The following extract from Table 12 exhibits the facts relative to this last-mentioned example:—

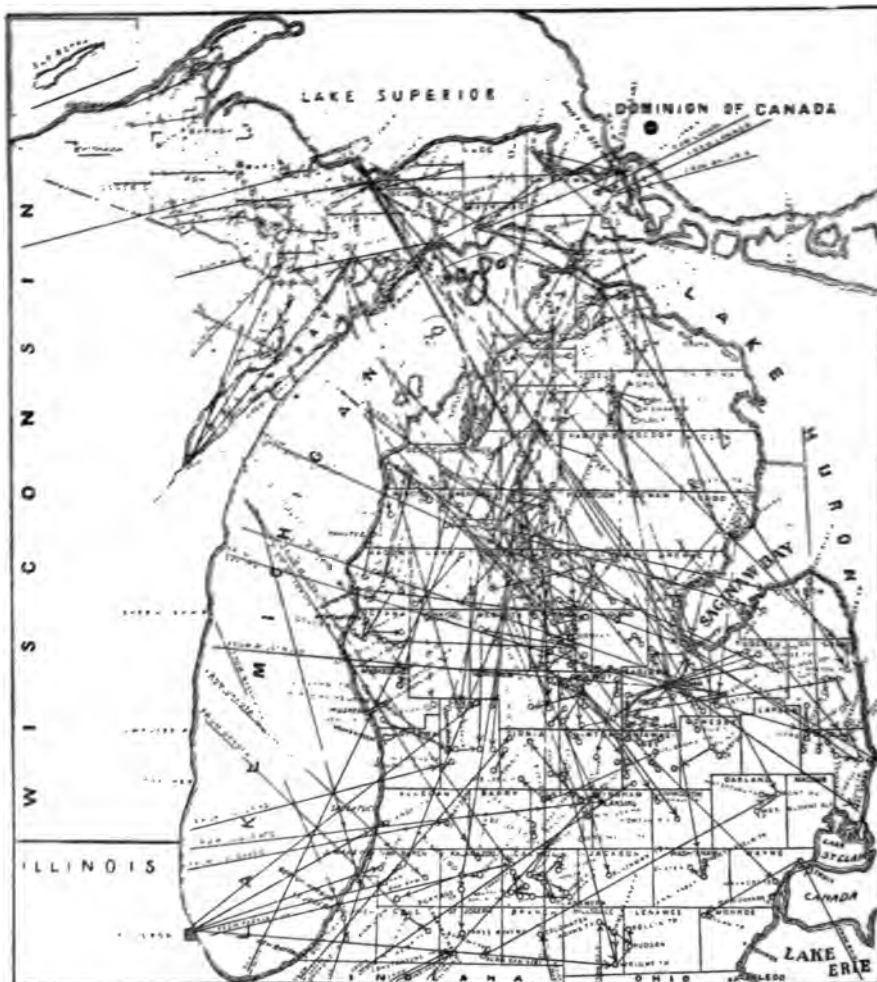
of infection of smallpox in Michigan in 1901.

Fourth localities infected from Third.			Fifth localities infected from Fourth.			Sixth localities infected from Fifth.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Chippewa county: Pickford township.... (Mar 20—Aug. 1.)	20	0						
{ Chippewa county: Bruce township,..... (April 30—May.)	1	0	{ Chippewa county: Trout Lake township. (March 20—.)	8	0	{ Iosco county: Tawas township*.. (May 2—.)	2	0
Superior township....	28	0						
Mackinac county: St. Ignace city..... (June 24—July 12.)	2	0	{ Mackinac county: St. Ignace city..... (Mar. 17—Sept. 26.)	13	0	{ Mackinac county: Moran township.... (Aug. 25—Oct. 25.)	15	0

* Seventh localities infected from Sixth.—From Tawas township the contagium further spread to two localities: Bay City, Bay county, with one case from May 13 to June 29, and Lincoln township, Arenac county, with one case from June 14 to July 11; no death.

The laxity in restricting the spread of smallpox in some of the smaller places is in contrast to the commendable work in restricting this disease in the two largest cities in Michigan,—Detroit and Grand Rapids. From Grand Rapids smallpox spread to only three outside jurisdictions, and from Detroit to only two other places.

MOVEMENTS OF CONTAGIUM OF SMALLPOX IN 1901.



THIS MAP ILLUSTRATES TABLE 12. LINES CONNECT THE LOCALITIES INFECTED. THE ARROWHEADS INDICATE THE DIRECTIONS OF THE MOVEMENTS.

(PLATE 116B)

CHICKEN-POX (VARICELLA) IN MICHIGAN IN 1901.

During the year ending December 31, 1901, there were reported to the office of the State Board of Health, 69 outbreaks of chicken-pox in 67 localities in Michigan which resulted in 477 cases. Relative to the isolation and disinfection of cases sick with chicken-pox, 106 cases were reported as isolation and disinfection both neglected, and 14 cases, isolation and disinfection both enforced. Of the remaining cases (357), 315 cases were reported as isolation or disinfection not mentioned or statements doubtful, 4 cases disinfection enforced and isolation doubtful, 23 cases, isolation enforced and disinfection doubtful, 5 cases, disinfection enforced and isolation neglected, and 10 cases, isolation enforced and disinfection neglected.

COWPOX IN MICHIGAN IN 1901.

March 19, 1901, the secretary of this Board wrote to Hon. J. H. Brown, President of the State Live Stock Sanitary Commission, Battle Creek, Mich., relative to the outbreak of suspected cowpox which occurred near Petersburg, Summerfield township, Monroe county, in 1900:

"April 6, 1900, I notified you of the reported existence of suspected cowpox near Petersburg, Summerfield township, Monroe county. In replying to my notification, you wrote: 'I have wired Secretary Tyler and Dr. Dunphy to meet me to-night at Adrian to investigate the Petersburg case of supposed cowpox. Will inform you as to results.'

"Will you have the kindness to inform me as to the results of your investigation of said outbreak, as promised?"

March 22, 1901, Hon. J. H. Brown wrote to Secretary Baker as follows:

"We found cowpox in the herd of E. L. Lockwood, near Petersburg, and that it had been in the herd for some time. The trouble was nearly over when we were there. Nearly all the large herd had been affected. Dr. Dunphy can give you a more complete history of the case."

March 19, 1901, Secretary Baker also wrote to H. F. Palmer, veterinary surgeon in Detroit, Mich., relative to the same outbreak of cowpox in Summerfield township as follows:

"May 8, 1900, relative to cowpox near Battle Creek and in Summerfield township, this State, you wrote to me as follows: 'In the near future I will issue an article giving in detail the result of inoculation experiments and visiting the farm near Battle Creek. When the article appears I will supply your office with a copy. If that article has appeared, I should be glad to receive the promised copy. If it has not yet appeared any information you can give me relative to this subject will be thankfully received.'

March 26, 1901, H. F. Palmer, V. S., Detroit, Mich., wrote to this office as follows:

"I send you by enclosed mail a copy of the report I have regarding my visits to cases of cowpox through the State. I regret to say that a press of work in our Biological Department has prevented our publishing this long ago. There is other data to be added and all will be incorporated in quite a comprehensive report. I will try to furnish you with a copy when published, but in the meantime I send you the enclosed."

The following is a copy of the report sent by H. F. Palmer to this office:

EXPERIMENTAL COWPOX FROM A NATURAL OUTBREAK.

On the 15th of March, I received from the State Veterinarian some material collected from diseased cattle near Battle Creek. This material was in the form of a dry, hard scab.

The only history of the disease was that it much resembled cowpox, but that the owner had been using local treatment of vaseline and carbolic acid to such an extent that it was difficult to tell what it was. One of the sores was thoroughly cleansed, the scab was removed and wrapped in a piece of sterilized muslin and sent by letter to me.

On the 16th inst., heifer No. 1188 was prepared in the usual way for vaccination by shaving and thoroughly cleansing the surface of the abdomen. Five spots were scarified in the usual manner and the spots inoculated with the scab. The heifer was then put in isolated quarters to await developments.

During the propagating period, the heifer's temperature ran as follows: 16-101°; 17-102°; 18-102°; 19-103°; 20-102°.

Five days after vaccination the heifer was put on the table, surface of abdomen cleansed with soap and water and scarified area carefully examined. Each scarified spot had at least one vesicle and two of the five spots had many small vesicles. These looked like typical cowpox vesicles. There was no eruption outside of the inoculated areas and no general swelling. The heifer fed well during the five days and showed no general diseased condition.

The contents of the vesicles was collected in a sterilized bottle and placed aside to be used as seed on another heifer.

Heifer No. 1188 was vaccinated in the usual manner with this seed and on the fifth day it was found to be a fair take of vaccine. The rear portion of the abdomen was a mass of small vesicles that looked like the typical cowpox vesicles. This material was collected as seed, and calf No. 1205 vaccinated with it. This proved to be a No. 1 -- vaccine, as there was quite a general eruption over the entire surface of the abdomen.

Material from this heifer was used to inoculate heifer No. 1214. This also gave us a No. 1 + quality of vaccine. One side of abdomen was such a mass of small vesicles that line of scarification could not be made out. Calf No. 1205 was revaccinated with different kinds of our stock vaccine, and it did not take at all, showing calf to be immune to regular vaccine.

Twelve persons were vaccinated with some of the virus taken from heifer No. 1214, and there was a take in each case.

Heifer No. 1188 was bled and some of the blood serum was mixed with vaccine and this mixture used to inoculate a calf. On the 5th day the calf showed but two or three small eruptions, thus demonstrating that this serum nearly killed regular vaccine.

In summary, then, we have the following proofs that the material sent was genuine cowpox:

1st. By successive inoculations.

2d. Calf vaccinated with this material was immune to our regular stock of vaccine.

3d. There was a take on the arm of twelve patients vaccinated with this material.

4th. Blood serum of an animal vaccinated with this material nearly killed regular stock vaccine.

The farm at Battle Creek was next visited to learn of the natural method of transmitting this disease. Here was found a large well-kept herd of fine looking dairy cows. Upon inquiry it was found that the trouble arose from a certain cow that had been brought into the herd some nine months previous. A short time after the arrival of this cow, it was noticed that she had sore teats. On account of the constant irritation of these sores by the milking, they were slow to heal.

After a couple of months other cows of the herd were also affected with sore udder and teats. Little boils would break out, as the stableman said of them. The stablemen milked the cows in regular order and those cows milked after the infected one were the first ones to develop the disease. The only manner of carrying the contagion seemed to be by the hand of the milkers. One after another of the cows would produce the characteristic pustules. However, after a lapse of nearly nine months there are still some of the herd that have been free from it. Calves born from these cows were allowed to nurse for a few days, and no sign of any disease developed among them.

The udder and teats were the only places affected and the trouble seemed to be of a local nature, as the cattle apparently suffered no inconvenience from the disease. They fed as usual and gave a normal quantity of milk.

The sores first appeared in the form of a small reddish pimple, later developing into a vesicle. The contents of the vesicle would dry up and form a scab. The constant irritation of this scab kept the sores from healing.

The owner of the cattle, who did the milking, was vaccinated some five years previous, and he stated that at no time had he been troubled with 'sores' on his hands.

A recent visit to a similar outbreak near Petersburg revealed the facts that the disease is spread by the hands of the milkers.

Here was found an eruption on the udder similar to the other herd, but in addition to the primary eruptions there seemed to be a secondary infection. An attendant who was said to have the varioloid some five years previous had three sores on his hands. The second appearing about one week after the first, the third one week after the second.

The pustules would appear on one quarter of the bag, and in about two weeks a knotty swelling would appear in another quarter followed by pustules and characteristic vesicles.

The surroundings of this herd were far from a proper sanitary condition. The food of the late spring was of a poor quality of ensilage. No doubt these two facts had much to do with a secondary infection.

Some material was collected from one of the pustules and a calf inoculated with it. In five days appeared the typical vesicles. This collected and transferred to a cow which also gave the vesicular eruption.

Among this herd were some three-months-old calves that had thick, scabby, scurvy looking places about the head and along the back. This material when planted on other cattle produced no results at all. The yearling and two-year-old cattle seemed to be immune thus far, as only milch cows showed the cowpox vesicles.

The owner stated that he had a similar trouble with his cattle in previous years, but that the sores always disappeared when he got his cattle out to grass.

There was also a cow among a herd near Ann Arbor that had an eruption on its body similar to the cowpox eruption. It appeared in the form of small pustules, yellow in appearance, and having yellowish contents of a creamy consistency. These were larger than the typical vesicles of cowpox, but otherwise dried up, and left a scabby surface much resembling it. Contrary to the other two outbreaks visited, this eruption was manifest along the posterior part of the thigh and around the shoulder region, while the udder and flow of milk were unaffected.

Some of the vesicular contents were collected and a calf was inoculated with it, but after the five days it was found not to have taken at all, thus showing it not to be cowpox.

In conclusion I would say that milch cows seem to be most susceptible to the disease.

The disease localizes itself on udder and teats.

The disease is usually transmitted by the hands of the milker.

SYPHILIS IN MICHIGAN IN 1901.

August 30, 1901, A. L. Taylor, M. D., health officer of Middleville village, Barry county, wrote to Doctor Baker, Secretary of the State Board of Health, relative to a case of syphilis, as follows:

"A complaint has been made to me in regard to a lady living here in town, who is suffering with syphilis. She has all the typical lesions of the disease. The lady is a mother of a small boy about three or four years of age. The mother is a firm believer in Christian Science and has not taken any treatment for her disease. She will not take any precautions to protect the child or others. The lady and child are in very poor circumstances. What action can I take in this case for the protection of the child and others whom she may come in contact with."

August 31, 1901, the secretary wrote to Doctor Taylor, as follows:

"Replying to your letter of yesterday, relative to your action in the case of a lady afflicted with syphilis within your jurisdiction, the law gives you as health officer authority to act for the restriction of the disease. (Act 137, 1883.) Unless your local board has formally instructed you to do otherwise, I think that placarding ought, in some way, to be avoided, if practicable. Perhaps your local board can, by studying the facts, devise some way to prevent the spread, and still not be very offensive."

August 31, 1901, Dr. J. M. Galbraith, health officer of Montrose township, wrote to this office as follows:

"I was called today to consult with another physician here, by the health officer of the village, to see a lady who is undoubtedly suffering from secondary syphilis, including blepharitis and conjunctivitis, and one, not large, sore on her lip. The case was pronounced syphilis, and the health officer ordered her to keep out of his jurisdiction as health officer. By the way, she comes from the township of which I am health officer.

"I understand this evening that the school forbids this lady's daughter, a very nice little girl, without a pimple on her, to attend school in the village, where she stays and lives with another party in the village. Please give me the law on this subject. The village health officer I requested to make this same inquiry. I have my idea but from you would have more force."

September 10, 1901, the secretary of this Board wrote to S. H. Lake, health officer of Montrose village, relative to the case of syphilis in his jurisdiction, as follows:

"Replying to your letter of September 5, in that part relating to the restriction of syphilis, you as health officer doubtless have the power under Act 137, 1883 (printed on pages 3 and 4 of the enclosed leaflet), to take measures for its restriction, as it is certainly a communicable disease dangerous to the public health. However, I would advise that the placarding the premises be obviated if possible; and, really there is no good measure yet worked out for the restriction of that disease. If you devise one, I trust you will report the details."

ERYSIPELAS IN MICHIGAN IN 1901.

During the year 1901, reports relative to seventy-three cases of erysipelas were received at this office from eighteen localities in Michigan as follows:

Ishpeming city, Marquette county, three cases; Waterford township, Oakland county, four cases; Cambridge township, Lenawee county, one case; Girard township, Branch county, two cases; Mt. Pleasant city, Isabella county, one case; Ypsilanti city, Washtenaw county, one case; Clare city, Clare county, two cases; Hudson city, Lenawee county, one case; Coldwater city, Branch county, one case; Cass city village, Tuscola county, one case; Flint city, Genesee county, one case; Albion village, Calhoun county, four cases; Battle Creek city, Calhoun county, two cases; Kalamazoo city, Kalamazoo county, forty-one cases; Muskegon city, Muskegon county, four cases; Muskegon Heights, Muskegon county, two cases; Benson township, Oceana county, one case; Saginaw city, Saginaw county, one case.

Of the seventy-three cases of erysipelas, three cases were reported as facial erysipelas. The source of contagium was not known in any of these instances, but precautions were taken to prevent the spread of the disease.

PUERPERAL FEVER IN MICHIGAN IN 1901.

During the year 1901, four non-fatal and two fatal cases of puerperal fever were reported to the office of the State Board of Health. The fatal cases occurred in May and December, respectively, in Bedford township, Monroe county, and Waterford township, Oakland county; the non-fatal cases occurred in Centerville village, St. Joseph county, Elk Rapids village, Antrim county, Baldwin village, Lake county, and Whiteford township, Monroe county.

The above mentioned cases must not be understood to include all the cases of puerperal fever which occurred in Michigan in 1901, for of the 5,850 postal-card reports received at this office during the year 1901 from observers in different parts of the State, about two per cent, stated the presence of puerperal fever in the localities from which the reports were sent.

ITCH IN MICHIGAN IN 1901.

During the year 1901, two outbreaks of itch were reported to this office from the following localities: Clam Union township, Missaukee county, and Winterfield township, Clare county.

Relative to the outbreak of itch in Clam Union township, Missaukee county, the health officer wrote to this office as follows:

"Complaint has been made to me by the school director of principal school district No. 3, Clam Union Township, on account of some children in said school district who had the itch. Is this case my duty as health officer to look after and keep said children out of school, or is it the duty of said school board to look after? If it is my duty as health officer, to look after, please inform me how and what to do."

In reply to the health officer's letter, Secretary Baker wrote as follows:

"In reply to your favor of Dec. 14, relative to your powers and duties in cases of itch, there is no statute declaring directly upon this subject, and this Board has not, as yet, published a leaflet upon the subject.

"By Sec. 4412, C. L. 1897, every local board of health shall make such rules and regulations respecting sources of filth and causes of sickness as they shall judge necessary for the public health and safety. My advice is that itch is not a 'disease dangerous to the public health,' and that the school board should exclude the children having itch, because it interferes with the best work in the school."

Relative to the outbreak of itch in Winterfield township, Clare county, the secretary of this Board wrote to E. R. Chapin, health officer of that township:

"Relative to children attending school who have 'itch' I think that they should not be allowed to attend while they are having the disease. You do not state very fully the nature of the disease and inasmuch as 'Cuban itch' has been reported from a number of localities, which has proved in each instance to be smallpox in a mild form, I am therefore very much interested in the subject and I trust that you will fully describe all the symptoms of this disease and also the signs of the disease. Do the children have a headache, backache or fever before the eruption appears, and does the fever subside when the eruption appears? Also, what is the character of the eruption? I am very anxious to know all about this 'itch' and trust that you will kindly give all the information you can relative to the subject."

December 7, 1901, Health Officer Chapin wrote as follows:

"This case is just 'itch'—the seven years', filthy brand—and nothing else. What I wish to know is the proceedings to take regarding 'common itch.' Is it a matter for the health board, the school board, or the health officer to look after? This case is in a family of Christian Scientists and they are opposed to doing anything to eradicate the disease."

MUMPS (PAROTITIS) IN MICHIGAN IN 1901.

During the year 1901, nineteen outbreaks of mumps, resulting in one hundred and seventeen cases, were reported to this office from the following localities: Battle Creek city, Calhoun county, two cases; Alamo township, Kalamazoo county, one case; Kalamazoo city, Kalamazoo county, sixteen cases; Grand Rapids city, Kent county, seventy-seven cases; Rush township, Shiawassee county, one case; Lima township, Washtenaw county, one case; Ypsilanti city, Washtenaw county, one case; Sherman township, Isabella county, one case; Deckerville village, Sanilac county, one case; Wheatland township, Mecosta county, one case; Haight township, Ontonagon county, one case and one death; Whiteford township, Monroe county, two cases; Summit township, Mason county, one case; Coldwater city, Branch county, one case; Prairieville township, Barry county, one case; Unadilla township, Livingston county, one case; Manton village, Wexford county, one case; Casco township, Allegan county, six cases, and Marshall township, Calhoun county, one case.

The following extracts from correspondence of this office give details relative to some of the outbreaks mentioned:

Mumps in Wacousta village, Watertown township, Clinton county.—April 26, 1901, J. E. Hinkson, M. D., health officer of Wacousta village, wrote to this office as follows:

"My attention has been called to some cases of parotitis in my jurisdiction and not understanding definitely the position the State Board of Health has taken as regards that disease, I write you for information."

234 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

April 27, 1901, the secretary of this Board wrote to Dr. Hinkson:

"In reply to your favor of April 26, this Board has never taken active measures for the restriction of mumps, for the reason that it is not usually considered 'a disease dangerous to the public health,' as the term of the law expresses it. However, I think that children affected with mumps should not be permitted to attend school or associate in large gatherings of children. For the reason mentioned above, this office has never required reports from health officers relative to mumps. Any facts of interest in connection with an epidemic or a case, which a health officer may observe as useful in the interests of public health, will be greatly appreciated."

Mumps in Pierson township, Montcalm county.—January 22, 1901, Geo. H. Godfrey, health officer of Pierson township, wrote:

"There has been a complaint made to me that children in a school district have been exposed to mumps, teachers and most of the children hadn't had it. Now I would like to know if the health officer has any right to keep these children at home or not?"

January 23, 1901, Secretary Baker replied as follows:

"Relative to mumps, this Board has never taken any action for the restriction of the disease for the reason that within the meaning of the law, it has not been considered a dangerous disease; but mumps is a communicable disease and children so afflicted should remain away from school. The law does not require reports relative to mumps to be made to the State Board of Health, nor the isolation of those sick with it. Perhaps school officers might forbid persons sick with mumps attending school?"

TETANUS IN MICHIGAN IN 1901.

During the year ending December 31, 1901, one fatal case of tetanus was reported to have occurred in Centerville village, St. Joseph county. A. F. Kingsley, M. D., health officer of Centerville village, sent a report to this office of the case.

June 15, 1901, the secretary of this Board wrote to Dr. Kingsley as follows:

"I am in receipt of your report that Wm. Steninger is sick with tetanus. Because of the infrequency but importance of outbreaks of this disease, I hope you will give this office a complete statement of the history of the case from its commencement to its conclusion. Please give the probable cause of the outbreak, the number of persons sick and the outcome of each case; also the signs and symptoms of the disease. I will be glad to receive any further information which you may be able to furnish."

June 24, 1901, Health Officer Dr. Kingsley wrote to this office as follows:

"According to your request relative to the case of tetanus in my jurisdiction, you will find enclosed as complete a history of the case as I could give. Should you publish it, I would be pleased to receive a copy. No other case has occurred.

"Wm. Steninger, age 33; occupation, drayman; nationality, German, American born. Previous condition of health good. Resident Centerville, Mich.

"Friday, June 4, 1901, while hauling shingles which had recently been removed from the roof of an old grain elevator in this village, about 9 a. m., he stepped on a cut shingle nail which was in a shingle. The nail pierced and penetrated the sole of his shoe and stocking, and penetrated the sole of his left foot to the depth of about $\frac{3}{4}$ of an inch. The wound was located just external to the metacarpo-phalangeal articulation of the great toe. As very little pain was caused by the injury, patient pulled out the nail and proceeded with his work. At 6:30 p. m. I was called to see the patient, as he was suffering some pain. Arriving at 7 p. m., and learning the nature of the wound, I at once ascertained that the wound was well opened—it still more, washed it well with solution of bichloride of mercury 1-500, cleansed it antiseptically, and after leaving a sedative to relieve the pain left the patient for the night. Next morning I called and found the pain still severe. Again went over the antiseptic treatment of the wound with about the same result or rather lack of result. On Sunday morning it was repeated and Monday morning patient was up town on crutches. The pain he had complained of at this time he explained as being of a throbbing nature, increased when the foot was dependent, but relieved by elevating the member. He said it extended well up toward the knee.

"On Tuesday I again saw the case. Pain was still the predominant symptom, but now he said it felt as tho' the great toe was cramping and as he said 'wanted to draw up,' i. e., forced extension. I increased the sedatives and continued antiseptics of the wound, to such an extent as to be almost unendurable to the patient while I was treating it.

"The treatment seemed to influence the disease very little and on Wednesday afternoon he first complained of stiffness of the jaw. That night I gave enormous doses of potassium bromide, with chloral, and about 7:00 Thursday morning I was again called. Patient had been in great agony all night and now said his neck felt numb, vomiting prevented giving medicine by the mouth, and enemata were resorted to.

"Severe convulsions occurred frequently now. Every slight noise, breath of air, or in fact every external stimulus however slight would precipitate a convulsion. Chloroform was resorted to to relieve them and served quite well until Friday forenoon. At this time the diaphragm became involved and with each convulsion respiration was almost impossible.

"Sedatives now seemed to have little or no effect, even the chloroform. The temperature which to this time had been normal, about 3 p. m., Friday, began to rise and continued to do so up to the time of death, which occurred about 6:30 p. m., and resulted from suffocation during a convulsion. The face was terribly drawn and patient was evidently in terrible agony. The period of incubation can be seen to have been about five days, i. e., until stiffening of the jaw occurred, although I believe the cramping pains of the great toe was due to the tetanus toxin. This began on the fourth day. Counting this as the beginning, the disease ran its course in four days, thus proving the truth of the Hippocratic aphorism relative to convulsions following an accident."

TUBERCULOSIS IN ANIMALS IN MICHIGAN IN 1901.

Tuberculosis, or suspected tuberculosis, in animals, was reported present in three localities in Michigan in 1901, as follows: Kalamazoo city, Kalamazoo county; Edward P. O., Ogemaw county, and Kingston village, Tuscola county.

The following extracts from correspondence give details relative to the above mentioned occurrences, which must be an insignificant portion of such disease in the State:

March 27, 1901, Wm. Kammerer, Kalamazoo city, wrote to this office as follows:

"I wish to inform you of my case. I had my herd tested by Dr. Dunphy, and Brown (of the State Live Stock Commission), but am not satisfied. They pronounced them all right. I had calves sucking them at the time which were sick at the time which I told them to kill and examine, but they thought it not worth while. A few days later I killed three of them. I took the plucks to Dr. Y—. He examined them and pronounced tuberculosis. There were ulcers larger than a goose egg. Some of the lungs were grown to the sides and some to the lining. One I found with them all through its bowels. This last one was not over three weeks old, the others were about five weeks. It does seem to me there must be something wrong about the cows as the calves all appear to be healthy when I get them. Is it possible that the tuberculin was not good? I still have a few calves. Have stated things as near as I could."

December 8, 1901, the following letter was received from Norris Cummings, supervisor of Clement township, Gladwin county:

"One of my neighbors has lost four or five head of young cattle and have, as I understand, employed a qualified veterinary, L. C. Orr, from Caro, Mich., and he called it tuberculosis. Notify me or send a man to investigate, as I never had any experience with such."

Reprints 543, 567 and Pamphlet and slip on Tuberculosis, 274 and 300, were sent to Supervisor Cummings, Edward P. O., Ogemaw county.

Suspected tuberculosis in horses in Kingston village, Tuscola county.—August 13, 1901, a letter was received at this office from Ed. Farrel, Kingston village, Tuscola county, which was a copy of a letter sent by him to the State Live Stock Sanitary Commission, relative to tuberculosis in horses:

"I own a span of horses which I suspect are afflicted with tuberculosis, or some infectious disease.

"Will you kindly notify the State Veterinarian to take the proper steps in the matter as required by law?

"Have notified the local health officer."

A postscript was added to the letter to the Secretary of the State Board of Health, which reads as follows:

"Kindly see that the foregoing gets to the proper person or persons who have authority to act in the matter."

GLANDERS (FARCY) IN MICHIGAN IN 1901.

During the year ending December 31, 1901, there were reported to this office five outbreaks of alleged glanders, or farcy, in horses from five localities in Michigan: South Branch township, Crawford county; Grayling township, Crawford county; Caro village, Tuscola county; Parma village, Jackson county; and Inland township, Benzie county.

The following extracts from correspondence of this office give details relative to three of the above mentioned outbreaks:

February 18, 1901, Fayette P. Richardson, health officer of South Branch township, Crawford county, wrote to this office as follows:

"There has been a notice sent to me that there was a case of glanders at J. H. Hartmans. He lives in T. 26 N. of R. 1 W. It is in South Branch township. We have 25 N. of R. 1 W., 26 N. of R. 1 W., and 25 N. of R. 2 W., in this township. J. M. Smith says, the children has the same as the horses has. He says the discharge from their nostrils stinks like carrion. I should not know glanders from distemper, as I never saw a horse that had it. I don't think we have any one here that is veterinarian enough to decide it. I would like to have the State Veterinarian see the horses. The stage runs to Jack Pine P. O. every day from Roscommon, that is two miles from J. H. Hartmans; the P. M. is his cousin. He would take him from there to see the horses. I don't know what to do about it."

Feb. 19, 1901, the secretary of this Board wrote to Health Officer Richardson, as follows:

"Replying to your letter of February 18, permit me to state that glanders is a communicable disease dangerous to the public health, and every precaution should be taken to prevent the spread either to animals or man. In case of any uncertainty in diagnosis, the public health should be given the benefit of the doubt, and all the necessary preventive and restrictive measures promptly and thoroughly enforced.

"I have written the substance of your letter to Hon. J. H. Brown, President State Live Stock Sanitary Commission, Battle Creek, Michigan, and asked that he give it attention as soon as practicable."

May 25, 1901, Stanley N. Insley, M. D., health officer of Grayling township, Crawford county, wrote to this office:

"I have in my jurisdiction a horse which I believe to have farcy. I have ordered it isolated, with instructions to keep the same until the State Live Stock Sanitary Commission could be informed of the same. Would you kindly inform the proper authorities, as I do not know the address?"

May 27, 1901, the Secretary wrote to Dr. Insley, as follows:

"Replying to your letter of May 25, permit me to state that I have informed Hon. C. A. Tyler, of the State Live Stock Sanitary Commission, of a case of farcy being within your jurisdiction.

"Your action in ordering the case isolated was correct, and I trust you will see that every precaution is taken to prevent the spread of the disease."

August 26, 1901, a postal card from Mrs. Augusta Campbell, Ellington village, Tuscola county, was received at this office which reads as follows:

"I have a horse which has been examined by our local Vet., and he is afraid it is affected with the glanders, though he is not sure. Says it is a very suspicious case. Has been reported to State Vet., but he cannot see to it. Can you do anything about it?"

August 27, 1901, Secretary Baker wrote to Mrs. Campbell relative to the outbreak of glanders, as follows:

"I have sent the information to Hon. H. H. Hinds, President of the State Live Stock Sanitary Commission, Stanton, Michigan, and under separate cover I send you a pamphlet relative to the subject. Your local health officer should be notified.

"Glanders is a disease dangerous to man as well as animals, and you should, therefore, use every precaution to prevent its spread to man or animals. It is a 'dangerous communicable disease.'"

ANTHRAX IN MICHIGAN IN 1901.

Relative to a death from anthrax in Grand Haven city, Ottawa county, the secretary of this Board wrote to Dr. W. S. Walkley, health officer of Grand Haven city, as follows:

"In the office of the Secretary of State a certificate of death has been filed stating that Henrietta McKay died May 21st from anthrax, the certificate being signed by Dr. A. Vanderveen.

"Anthrax is a very malignant disease not now common in this country. Will you kindly investigate this case thoroughly and inform this office fully as to the circumstances of this case? Please be very particular to discover the source of the contagion, whether or not other cases have been known to exist, and whether and by whom bacteriological examination has been made."

June 17, 1901, Health Officer Walkley wrote:

"Your letter of June 14, concerning a case of anthrax resulting in the death of Henrietta McKay of this place, received. I have made careful inquiry and can find no clue to the origin of this case. There is no evidence of any others either before or since. There was no bacteriological examination. Dr. Vanderveen has written you quite fully on the subject and I would refer you to his report for any further information. It is quite possible that the malignancy was due to the pin with which the pustule was opened by Mrs. McKay, as suggested by Dr. V."

June 17, 1901, a letter was received at this office from Dr. Vanderveen, the attending physician, which gives a history of the case, as follows:

"Referring to your recent letter in regard to the death of Henrietta McKay from anthrax, I have the pleasure to give you the following particulars: On the tenth of May last, a small pustule made its appearance (from an unknown cause) on center of left cheek about an inch below eye. Soon became painfully inflamed, and about two days after patient deliberately made an effort to remove small scab formed, with a pin, and repeated this operation at different times within a period of four or five days, until she was prevailed upon to call in medical aid.

"My services were required May 16th at 9 p. m., when my attention was attracted first and above all to the severe constitutional infection as presented in the form of acute intestinal colic, which was soon after accompanied with a profuse diarrhea, chilliness, rapid pulse, and a facial expression of anxiety—temp. 104°—these symptoms at once in my mind already eclipsed the local disorder.

"The cheek pustule was small but hard, with secondary vesicles near by, and the surrounding area three inches in extent infiltrated, swollen hard and purplish, the lymph vessels inflamed and veins radiatory in red lines, toward neighboring glands as far as the cervical within 48 hours—delirium ensued, and patient succumbed in the early morning May 21st. Immediate cause of death due to cerebral phlebitis from rapid absorption.

"Treatment consisted in hot local antiseptic fomentation, with strong Ichthyol salve following. Stimulants freely internally. The extensive facial phlebitis and infiltration of glands did not warrant any expectancy for good by deep incision or curetting, by reason of the unfavorable locality. The case having too far advanced, no bacteriological examination was made. It is not easy to determine whether this was a case of malignant pustule per se., from the start, or a benignant one, infected by the pin used. I have diagnosticated as to the former, due to the rapid malignant development of the case, and the early intestinal and general infection.

"Nothing is known as to the possible source of contagion. No other case existing."

RABIES (HYDROPHOBIA) IN MICHIGAN IN 1901.

During the year 1901, information relative to an outbreak of rabies, in Michigan, was first received at this office through a newspaper report. August 3, 1901, the secretary of this Board wrote to Dr. T. Arthur Prust, health officer of New Haven township, Easton, Shiawassee county, as follows:

"In the Flint Evening Journal of May 25, 1901, the following appears:

"Three weeks ago a dog on the farm of Herbert Alliton, north of Owosso, went mad and bit Mr. Alliton and one of his cows. He is in N. Y., taking the Pasteur treatment for rabies, the cow died, but before dying had bitten several other animals. Since then six other cows have gone mad and have had to be killed."

238 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1902.

"If in your vicinity, will you have the kindness to investigate this subject thoroughly, and report as to cause of the outbreak of rabies, the signs and symptoms of the animals and person or persons afflicted, and whether or not Mr. Alliton and any others died, or whether they recovered? I hope to receive your reply by an early date, and enclose stamped envelope therefor. Under separate cover I send you pamphlet relative to subject."

August 29, 1901, Dr. T. Arthur Prust wrote to this office as follows:

"Investigation of these cases yielded the following: The first thing to be noticed by the Allitons was that their dog seemed to act strangely. He had changed from his usual good temperament, and became restless and savage. When driving the cows or sheep he appeared to take hold of their heels or tails quite savagely and to cling to his hold, at the same time jerking and twisting as if trying to tear something to pieces. Shortly afterwards he became cross towards them and grabbed a neighbor by the 'calf' of leg. Soon such symptoms as snapping at imaginary objects, staring wildly around, and frequent howling, such as is made by a wolf made their appearance. It then dawned upon them their dog was mad and they decided to kill him, which they did, and buried the animal's remains. The cat next showed quite similar symptoms and bit the lady of the house. They also disposed of it. They then decided to watch the cattle and sheep. Six of the former, before the period of three weeks, showed symptoms of being mad. Their eyes bulged out and kept rolling wildly. They would run around the field, snapping at anything or nothing at times, and started up a series of howlings with intervals of quietude. Their appetites failed and they began to lose flesh and strength so rapidly that it was necessary to kill them also. Ten or eleven of the sheep went about the same way. It was over three weeks from the first appearance of trouble in the dog and both parties had been bitten, that they went to New York for the Pasteur treatment. No symptoms of the disease had appeared nor did afterwards appear in either of them. However, they took the treatment."

ACTINOMYCOSIS (LUMP JAW) IN MICHIGAN IN 1901.

During the year ending December 31, 1901, four outbreaks of actinomycosis (lump-jaw), in three localities in Michigan, were reported to the Secretary of the State Board of Health. The jurisdictions in which these outbreaks were reported to have occurred were: Flint city, Genesee county; St. Johns village, Clinton county, and Camden village, Hillsdale county.

January 15, 1901, J. H. Charters, M. D., health officer of Flint city, wrote a postal card to this office, relative to a case of actinomycosis, which reads as follows:

"There is a cow with a large growth on her jaw; is said to be tubercular and is on the farm of Charles Johnson of Mundy. They are about to butcher her and market in Flint. What shall I do about the matter?"

January 17, 1901, the secretary of this Board wrote to Health Officer J. H. Charters, as follows:

"Your postal of January 15, relative to the alleged intention to market diseased meat in Flint, same to be brought from Mundy township, is before me.

"I have brought the subject to the attention of the health officer of Mundy township, and the State Live Stock Sanitary Commission.

"Under its statutory powers the city board of health should make, publish, and enforce regulations which will prevent the sale of diseased meat."

January 17, 1901, the secretary of this Board wrote to Dr. C. B. Pearson, health officer of Mundy township, relative to the case of glanders in that locality, stating facts as were given by Dr. Charters, and received a reply from Floyd P. Alger, clerk of Mundy township, which reads as follows:

"Your letter of the 17th written to Dr. C. B. Pearson with reference to a cow on the farm of Charles Johnson received. As Dr. C. B. Pearson is sick in bed, he gave the letter to me, Floyd P. Alger, township clerk.

"I went to see Mr. Smith, he works the Johnson farm; he will not sell the cow until the State Live Stock Sanitary Commission can investigate."

July 5, 1901, J. V. Dooling, M. D., health officer of St. Johns village, Clinton county wrote:

MEAT POISONING AND DISEASED MEAT IN MICHIGAN IN 1901. 239

"Dr. Gohn, veterinarian, reported to me a case of actinomycosis occurring in a cow owned by Walbridge and Keys of this village."

July 6, 1901, the secretary of this Board wrote in reply to the health officer's postal card as follows:

"Information has been conveyed to Hon. C. A. Tyler, Member State Live Stock Commission, Nottawa, Michigan, as that Commission has to do with the subject of diseases in animals. I presume you will hear from Mr. Tyler very soon relative to the subject.

"Actinomycosis (lump-jaw) is a disease dangerous to the public health and precaution should be taken for the restriction of the disease. Your local board of health should take charge of the animal until the State Live Stock Commission can take charge of the same."

Relative to another case of actinomycosis (lump-jaw) in St. Johns village, F. C. Dunn, M. D., wrote to this office as follows:

"There has been reported to me by H. W. Gohn, V. S., a case of actinomycosis in a cow, the property of Mrs. B. Betley."

August 19, 1901, the secretary of this Board, in reply to F. C. Dunn, health officer of Brighton township, wrote:

"Please accept my thanks for your letter of August 15, reporting a case of actinomycosis in a cow belonging to Mrs. Betley. As such cases should be reported to the State Live Stock Commission, I have sent the information contained in your letter to Hon. H. H. Hinds, President of the State Live Stock Sanitary Commission, Stanton, Michigan.

"Actinomycosis being a disease dangerous to man as well as to animals, every precaution should be taken to prevent the spread of the disease. The disease is probably communicated to man by eating meat infected with the disease. Until the Live Stock Commission can take charge of the case, strict isolation should be enforced."

MEAT POISONING AND DISEASED MEAT IN MICHIGAN IN 1901.

June 11, 1901, L. G. Smith, M. D., Coleman village, Midland county, wrote to this office as follows:

"Last week I was called to a case of poisoning which I am sure was caused by eating pressed beef bought at a market in this place, said market proprietor claiming that he made the product himself. There were two women poisoned, the older one suffering from first, vomiting, second, purging, and later extreme prostration and tachycardia. The younger woman suffered from purging and vomiting, but not so much prostration. Succeeded in reviving the older woman, but she is yet in a weakened condition.

"The same night there were four or five cases in town, from eating of the same meat, but none were so ill as above mentioned. Sunday I was called to another case caused by meat bought at a grocery store here.

"Who is the Pure Food Inspector or Inspector of Foods, and what action should be taken to suppress the sale of such meats?"

Diseased meat in Durand village, Shiawassee county.—March 26, 1901, A. G. Cowles, M. D., health officer of Durand village, wrote to the secretary of this Board as follows:

"Last night I was informed that a farmer living about a mile from here, owned two cows which became diseased in the bag, he sold them both for five dollars, the man who bought them skinned them and fed the carcasses to the hogs at the slaughter-house belonging to the meat markets here. Now I write this asking you if this comes under my jurisdiction and if so what authority have I in the matter? Again I am told this morning that some men who keep dairies own cows with a peculiar disease of the bag.

"Have I any right to investigate, being health officer of township and village."

March 28, 1901, the secretary wrote to Dr. Cowles as follows:

"Replying to your letter of March 26, relative to your powers in a case where two diseased cows were sold to a meat dealer who fed the carcasses of the same to hogs, permit me to state that there seems to be no statute specifically covering the subject.

"Vaccinia—natural cow-pox—is present in dairy cows in some parts of Michigan. Is this the disease which affects the cows in your vicinity? If so it is spread by the hands of the milkers, some of whom are likely to have the sore (vaccination), on their hands."

ALLEGED NUISANCES IN MICHIGAN IN 1901.

During the year 1901, communications relative to 109 alleged nuisances in Michigan, were received at the office of the State Board of Health.

The causes to which the alleged nuisances mentioned in these communications were attributed, may be classified as follows:

Contaminated water, 14; unsanitary conditions, 27; slaughter-houses and slaughtering animals in public highways, 15; hogs and pig pens, 10; stockyards, 2; insufficiently buried animals, 6; barnyard, 1; feeding carcasses of dead animals to hogs, 1; creamery waste, 4; infected milk, 1; sawdust consumer, 1; illuminating oil stored in public buildings, 2; rendering tallow in business part of city, 1; privy vaults, 6; cesspools, sewer and sewer pipes, 5; bad drainage and open drain, 13.

Whenever complaint of an alleged nuisance is received at this office, the president of the local board of health whose duty it is to act, is usually informed of the nature of the nuisance, and is requested to investigate the same. At the same time the sections of law, and pamphlet publications of this Board pertaining to nuisances and to the duties of local boards of health relative thereto, are sent to him and also to the person making complaint. Two regular forms of letters are used for this purpose. The first is sent to the person making complaint of the nuisance, the other is sent to the president of the board of health of the locality where the nuisance is reported to exist.

In articles on alleged nuisances, published in previous annual reports of this Board, attention was called to the fact that a large proportion of the communications received at this office in regard to alleged nuisances came from local health officers and other township, city and village officials asking for information relative to points of law concerning nuisances, or requesting advice as to their duties, or to the proper legal procedure necessary to effect the prevention or abatement of nuisances. The correspondence of 1901, shows a continued desire on the part of the local health officials for advice and coöperation of this Board, which has been freely and cheerfully given, and it is believed with results beneficial to the public health.

The State Board of Health has no authority to enforce or order the abatement of a nuisance. Its powers in this respect are advisory. And while the board is willing to render such advice as it may be able to give on any subject, it is often the case in regard to nuisances, that prosecuting attorneys or other lawyers on the ground and acquainted with the facts, are in better position to give legal advice than is the office of the State Board of Health. The Secretary of the State Board of Health is always glad to learn of the efforts of local boards to abate nuisances, and what success attends those efforts, and solicits correspondence upon this subject. However, the State Board of Health cannot undertake to do for local boards that which the law has so well provided for their doing for themselves. In showing them how they can help themselves it really does more for them than to do their work; for when the local board has mastered the situation and removed a nuisance, it has secured a vantage ground which a distant authority could not so well secure and hold.

INJURIES AND LOSS OF LIFE AND PROPERTY ALLEGED TO
HAVE BEEN CAUSED BY THE USE OF KEROSENE,
IN MICHIGAN, DURING THE YEAR END-
ING DECEMBER 31, 1901.

Continuing a practice pursued in previous years, the office of the Secretary of the State Board of Health has, during the year 1901, sought to obtain information relative to each casualty, alleged to have been caused by the use of kerosene, which came to the notice of said office.

The principal sources from which this office obtains facts in regard to such casualties as above mentioned, are four, viz.: From reports by the fire marshal of Detroit, State inspectors and deputy inspectors of illuminating oils, local health officers, and from newspaper reports. Relative to the last of these sources of information it should be stated that the secretary of this Board does not accept as necessarily authentic, newspaper reports of casualties from the use of kerosene. When such reports come to his knowledge, he applies to the proper officials of the localities in which they are said to have occurred, for confirmation or contradiction of the reports, and for any information which these officials may be able to give in connection with the alleged casualties. A copy of the form of letter used on such occasions, is given in the annual report of this Board for the year 1892, page 334. The data collected from these sources show that during the year 1901, information was received at this office of the occurrence of 59 casualties consequent on the use of kerosene in Michigan. The casualties were reported to have occurred in 20 localities, causing loss of 5 lives and damage of property in Detroit to the amount of \$9,979.

TABLE 1.—*Casualties in Michigan during the year 1901, believed to have been consequent on the use of kerosene, information of which was received at the office of the Secretary of the State Board of Health. In this year the legal test was a flash test of 120° Fahr., in a Foster automatic tester.**

	Number of casualties.	Number of localities.	Pecuniary losses, dollars.	Lives lost.	Persons injured (not fatally).
In Detroit.....	35	1	9,979	1	.....
In State (outside Detroit)	24	19	.....	4	1
Total in Michigan.....	59	20	9,979	5	1

* In 1893, the legal test of kerosene, for illuminating purposes, was, by legislative enactment (Section 2, Act 94, Public Acts of 1893) made as follows: "It shall be the duty of the inspector and his deputies to provide themselves at their own expense with the necessary instruments and apparatus for testing the quality of said illuminating oils, and when called upon for that purpose to promptly inspect all oils hereinbefore mentioned, and to reject for illuminating purposes all oils which will emit a combustible vapor at a temperature of 120 degrees of Fahrenheit's thermometer: *Provided*, The quantity of oil used in the flash test shall not be less than half pint. The oil tester adopted shall be the Foster automatic tester cup, with the lighted wick placed inside the tube, and under the thimble which shall be used by the inspector and his deputies." Act 94 became operative July 1, 1893.

This reported damage does not include all the actual pecuniary loss occasioned by the above mentioned casualties, because in some instances where houses, barns and other property were destroyed the loss was not reported.

INJURIES AND LOSS OF LIFE AND PROPERTY ALLEGED TO HAVE BEEN CAUSED BY THE USE OF GASOLINE IN MICHIGAN IN 1901.

In 1901, as in former years, an effort was made, at the office of the Secretary of the State Board of Health, to collect facts respecting every casualty attributed to the use of gasoline, in Michigan, which came to notice. During the year there were received at the office of the Secretary of the Board reports of seventy-three casualties in eighteen different parts of the State alleged to have been caused by gasoline, with attendant losses of life and property, and personal injury as follows: Nine persons fatally injured; damage to property in Detroit to the amount of \$17,163.

TABLE 1.—*Casualties in Michigan during the year 1901, believed to have been consequent on the use of gasoline, information of which was received at the office of the Secretary of the State Board of Health.*

	Number of casualties.	Number of localities.	Pecuniary losses, dollars.	Lives lost.	Persons injured (not fatally).
In Detroit	47	1	17,163	2	.....
In State (outside Detroit)	26	17	.....	7	4
Totals in Michigan.....	73	18	17,163	9	4

The source of danger in the use of gasoline.—The special source of danger in the use of gasoline is its ready evaporation at low temperatures. When exposed to the air, gasoline evaporates quickly, its vapor mixes with the air, and therewith forms an explosive mixture which readily ignites when it comes in contact with a flame or other sufficient cause. This property of gasoline renders it more dangerous than is gunpowder. Some of the casualties reported were undoubtedly the result of ignorance, or disregard, of these facts.

INDEX.—REPORT FOR 1902.

[In this index, unless otherwise stated, the localities mentioned are in Michigan.]

	Page
Actinomycosis (lump jaw) in Michigan in 1901.....	238, 239
Address , annual, of the President of the State Board of Health.....	xiv-xviii
Age-periods , definition of, as used in articles.....	212
Agricultural College , meteorological conditions at, 1901.....	3-57
atmospheric pressure.....	54, 55
cloudiness.....	28, 29
humidity at.....	24, 25
latitude, longitude, altitude.....	3
rainfall.....	32, 33
temperature.....	3, 4, 12, 14, 18, 19
meteorological observer at.....	2
Alpena , meteorological conditions at, 1901.....	3-57
latitude, longitude, altitude.....	3
rainfall.....	32, 33
sunshine and clouds.....	57
temperature.....	16-19
wind, velocity of.....	42, 43
meteorological observer at.....	2
meteorological phenomena at.....	7, 8
Altitude at meteorological stations in Michigan, Table II.....	3
Animals , tuberculosis in.....	235
Ann Arbor , meteorological conditions at, 1901.....	3-57
atmospheric pressure.....	52-55
cloudiness.....	28, 29, 57
humidity.....	22-25
latitude, longitude, altitude.....	3
ozone.....	34-37
rainfall.....	32, 33
sunshine and clouds.....	57
temperature.....	3, 12, 13, 16-19
water in well, depth, temperature, etc.....	10
wind, direction, velocity, number of observations of.....	42, 43, 46-51
meteorological observer at.....	2
meteorological phenomena at.....	7, 8
Annual Report of the Secretary of the State Board of Health, printing and distributing of.....	xxi, xxii
of the Secretary of the State Board of Health, synopsis of contents..	vii
Annual reports (indexed reports, annual).....	
Anthrax in Michigan in 1901.....	237
Antitoxin treatment in cases of diphtheria.....	127-129
Atmospheric pressure , average, at meteorological stations, Table II.....	3, 52-55
average daily range.....	52, 53, 56
averages by months.....	53-55
normal range for series of years.....	53
range by months, 1901, compared with previous years.....	56, 92
Atmosphere , temperature of (indexed also under temperature).....	
temperature of.....	11-20
Average disease , and meteorological conditions.....	93, 94, 101
and total sickness.....	102-104
order of prevalence.....	86-91, 93, 103, 104
sickness from, in 1901, compared with previous years.....	104
Bacteriological examinations of sputa of alleged consumptives.....	125
Baker, M. D., Henry B. , Secretary of the State Board of Health, address, etc.....	viii
Battle Creek , meteorological conditions at, 1901.....	3-57
atmospheric pressure.....	52-55
cloudiness.....	28, 29, 57
humidity.....	22, 25
latitude, longitude, altitude.....	8

Battle Creek, meteorological conditions at, 1901.— <i>Continued.</i>	Page
ozone	34-37
sunshine and clouds.....	57
temperature	3, 12, 13, 16-19
wind, direction, and number of observations of.....	46-51
meteorological observer at.....	2
Barometric pressure, average, at meteorological stations in Michigan.....	3
Belknap, M. D., Fred R., member of State Board of Health, address, etc.....	viii
Blanks for reporting outbreaks of communicable diseases.....	105
Board of Health, State, annual address of the President.....	xiv-xviii
collection, compilation and dissemination of information..	xix-xxiv
committees, standing.....	viii, ix
examination and licensing of embalmers.....	xi, xii
expenditures, embalmers' fund.....	xii
expenditures.....	xxvi, xxvii
instructions to health officers, by telephone and telegraph	xxii, xxiii
meetings, regular and special.....	xiii
members of, names, addresses, and terms of office.....	viii
meteorological conditions at office of, 1901.....	3-57
atmospheric pressure	52-55
cloudiness	23, 29, 57
halos	80, 81
humidity	22-25
latitude, longitude, altitude.....	3
ozone	34-37
rainfall	32, 33, 173
sunshine and clouds.....	57
temperature	3, 4, 12-20
water in well, depth, temperature, etc.....	10, 164-166
wind, direction, velocity, observations, etc.....	39-43, 46-51
meteorological observer at office of.....	2
meteorological phenomena at office of.....	7-9
pamphlets and other publications of.....	viii, xxiii
plans for State buildings examined by.....	x, xi
publication of proceedings of meetings of.....	xxiv
publications connected with licensing of embalmers.....	xii
report of the secretary relative to property of.....	xxiv-xxvi
reports, quarterly, of secretary relative to work in office of..	xxiv
reprints of publication of.....	xiii
work done in the office of the secretary.....	xix-xxiv, xxvii, xxviii
work of, during the fiscal year.....	ix-xiii
work in connection with sickness statistics.....	xxix
Bowels, inflammation of, as a comparative cause of sickness.....	86, 91
per cent of observers reporting presence of.....	71-73
per cent of weekly card reports stating presence of.....	63-65, 100, 103
relation of, to certain climatic conditions.....	99, 102
summaries of prevalence as regards time and area.....	74-85
Boyne Falls village, Charlevoix county, spread of smallpox from.....	226
Brain, inflammation of, as a comparative cause of sickness.....	86, 91
per cent of observers reporting presence of.....	71-73
per cent of reports stating presence of.....	63-65, 100, 103
relation of, to certain climatic conditions.....	99, 102
summaries of prevalence, as regards time and area.....	74-85
Bronchitis as a comparative cause of sickness.....	86, 89, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 70, 95, 96
relation of, to meteorological conditions.....	93, 94, 95, 101
summaries of prevalence as regards time and area.....	74-85
Bulletins of Health in Michigan, purposes of.....	60, 61
Teachers' Sanitary, issuing of, by State Board of Health.....	xxii
Teachers' Sanitary, list of some of the articles, authors and bulletin in which published.....	xxii
Burns, A. G., meteorological observer, Sault Ste. Marie.....	2
Card reports (indexed reports, card).....	2
Caulkins, M. D., John S., meteorological observer, Thornville.....	2
Cerebral meningitis (indexed meningitis).....	
Cerebro-spinal meningitis (indexed meningitis).....	
Chicken-pox (varicella) in Michigan in 1901.....	229
Cholera infantum, as a comparative cause of sickness.....	86, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 70, 100
relation of, to meteorological conditions.....	99, 102
summary of prevalence, as regards time and area.....	74-85
Cholera morbus as a comparative cause of sickness.....	86, 89, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 70, 100
relation of, to meteorological conditions.....	99, 102
summaries of prevalence as regards time and area.....	74-85
Clerks of boards of health, annual reports from, discontinued.....	ix
Climate and sickness.....	93-104
Cloudiness	28-30, 92
Cloudy and sunny days at certain stations in Michigan in 1901.....	57
Cold-weather diseases, relation of, to meteorological conditions.....	93-98, 101
Communicable diseases, dangerous (indexed diseases, communicable).....	

INDEX.

245

	Page
Compilation, annual, of weekly postal-card reports.....	61
of communicable diseases, some of the purposes of.....	107
Conference of health officials, general, subjects discussed.....	ix, x
Conger, Norman B., meteorological observer, Detroit.....	2
Consumption.....	110-125
ages of prevalence of, and mortality from.....	116, 117, 119
and pulmonary consumption, numbers of deaths from each by months in 1901, and average for 1894-1900.....	115
as a comparative cause of sickness.....	86, 89, 90, 91
average age.....	120
cases reported as recovered, ages, and duration of sickness.....	119
consumptive relatives and associates of cases of.....	121, 122
death-rates, according to reports to the Secretary of State.....	111, 112
disinfection of sputa, soiled articles, rooms, etc., in cases of.....	123
distribution by counties in 1901.....	113-115
disposal of bowel discharges in cases of.....	123
duration of sickness from.....	118-121
final reports of, information contained in.....	124, 125
how most commonly spread.....	117, 118
in 1901 compared with previous years.....	110-112, 115
manner in which disease began in reported instances.....	124
number of places at which present each week in 1901.....	106
organs affected in reported cases.....	120, 121
per cent of observers reporting presence of.....	71-73
per cent of reports received through newspapers.....	xxviii, 108, 109
per cent of reports, weekly card, stating presence of.....	63-65, 97, 103
relation of, to meteorological conditions.....	93, 94, 101
sickness and death-rates from reported.....	111-116
source of contagium of.....	117, 118, 125
summary of prevalence as regards time and area.....	74-85
Consumptives, bacteriological examinations of sputa of, results.....	125
nationalities of, in reported instances.....	124
occupation of, in reported instances.....	122
Conventions, sanitary.....	ix
Cowpox in Michigan in 1901.....	229-231
Cronk, J. W., meteorological observer, Port Huron.....	2
Croup, membranous, as a comparative cause of sickness.....	86, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 87, 96
relation of, to meteorological conditions.....	93, 94, 101
summaries of prevalence as regards time and area.....	74-85
Dangerous communicable diseases (Indexed diseases, communicable).	
Detroit, meteorological conditions at, 1901.....	3-57
halos.....	30, 31
latitude, longitude, altitude.....	3
rainfall.....	32, 33
sunshine and clouds.....	57
temperature.....	16-19
wind, velocity of.....	42, 43
meteorological observers at.....	2
meteorological phenomena at.....	7-9
Diagram I, average temperature by months, 1901.....	13
II, average daily range of temperature, by months, 1901.....	19
III, absolute humidity by months, 1901.....	23
IV, relative humidity, by months, 1901.....	25
V, number of observations of fogs in each month of 1901.....	27
VI, average per cent of cloudiness by months, in 1901.....	29
VII, rainfall, by months in 1901.....	33
VIII, ozone, day, by months in 1901.....	35
IX, ozone, night, by months in 1901.....	37
X, wind, velocity by hours and months, 1901, at Lansing.....	41
XI, wind, velocity by months in 1901.....	43
XII, wind, direction of, by months, at stations, 1901.....	51
XIII, wind, direction of, average 10 years, 1891-1900.....	45
XIV, wind, direction of, by year and months, 1901.....	45
XV, wind, direction of, in Michigan, in 1901.....	46
XVI, atmospheric pressure by months in 1901.....	55
1, death-rates from scarlet fever, 1868-1900.....	169
death-rates, from consumption, 1869-1900.....	112
isolation and disinfection restrict diphtheria.....	135
isolation and disinfection restrict measles.....	195
isolation and disinfection restrict scarlet fever.....	175
isolation and disinfection restrict smallpox.....	219
isolation and disinfection restrict typhoid fever.....	158
Diagrams 1, 2, 3, 4, 5, weekly reports of sickness.....	70, 87, 98, 103, 104
of results of restricting communicable diseases printed and distributed.....	xxiii
relating to meteorological conditions, explanation of.....	42, 44
Diarrhea, as a comparative cause of sickness.....	86, 89, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 70, 100
relation of, to meteorological conditions.....	99, 102
summaries of prevalence as regards time and area.....	74-85

	Page
Diphtheria	127-139
ages of prevalence of, and mortality from	127, 136-138
antitoxin treatment in	127-129
as a comparative cause of sickness	86, 90
average age	137, 138
distribution in counties, cities, villages and townships	128-131
duration of sickness	138, 139
incubation period	136
in each month of the year 1901	131, 132
isolation and disinfection, results	133-135
number of localities at which present each week in 1901	106
number of localities infected in each month, 1901	131
per cent of observers stating presence of	71-73
per cent of reports, weekly card, stating presence of	63-65, 87, 96
relation of, to meteorological conditions	93, 94, 101
reports received, per cent received through newspapers	xxviii, 108, 109
sickness and death-rates and fatality from	128-131
source of contagium, how the disease is spread	132
summaries of prevalence as regards time and area	74-85
Disease, the average	86-91, 93, 102-104
Diseases, average number on each card-report, and number of reports received	88
cold and warm weather, and meteorological conditions	93-102
communicable,	105-239
deaths from each of, comparison by a scale	180, 181
definition of outbreak	107
distribution of information regarding restriction and prevention of	xxi
Geo. E. Ranney, M. D., State Inspector of	217
immigrants possibly exposed to	xxiii, xxiv
method of obtaining information, and documents transmitted by State Board of Health during outbreaks of	105
newspaper reports of	xxviii, 108, 109
number of places at which present each week	106
number of reports from all sources of	108, 109
some of the purposes of compilation of	107
special reports relative to	xx
from which there was a marked increase or decrease in prevalence	61, 62
in order of apparent amount of sickness	86, 88, 89-91
method of comparison by years, months, and weeks	62
order of prevalence by geographical divisions of State	90, 91
per cent of observers reporting presence of	71-73
per cent of reports stating presence of	63-65, 70, 87, 96-98, 100, 103, 104
relation of, to meteorological conditions	93-104
summaries of prevalence of	74-85, 101
time of greatest prevalence of each of the	58-104
Diplococcus intracellularis meningitidis	189
Disinfection (indexed also isolation and disinfection)	
of clothing, sputa, and rooms of consumptives	125
Divisions of State, geographical, locations and names of observers reporting from	2
geographical, prevalence of diseases by	74-85
Documents on communicable diseases distributed by State Board of Health	105
Duff, F. H., meteorological observer, Alpena	2
Dysentery as a comparative cause of sickness	86, 90, 91
per cent of observers reporting presence of	71-73
per cent of reports, weekly card, stating presence of	63-65, 70, 100
relation of, to meteorological conditions	99, 102
summaries of prevalence as regards time and area	74-85
Embalmers, act to authorize State Board of Health to examine, etc.	xi
examination and licensing of	xi, xii
Embalmers' fund, expenditures of, by State Board of Health	xii
Erysipelas as a comparative cause of sickness	86
in Michigan in 1901	232
per cent of observers reporting presence of	71-73
per cent of reports, weekly card, stating presence of	63-65, 97, 98
relation of, to certain climatic conditions	93, 94, 101
summary of prevalence as regards time and area	74-85
Exhibit 1, whooping-cough, death-rates for each year 1869-1901	206
Fallon, W. H., meteorological observer, Grand Haven	2
Farcy (glanders) in Michigan in 1901	236
Fogs	26, 27
Force, Wm. M., meteorological observer, State Board of Health, Lansing	2
Gasoline casualties in Michigan in 1901	242
Geographical divisions of State (indexed divisions of State)	
German measles (rötheln) in Michigan in 1901	180
Glanders (farcy) in Michigan in 1901	236
Grand Haven, meteorological conditions at, 1901	3-57
latitude, longitude, altitude	3
ozone	34, 36
rainfall	32, 33
sunshine and clouds	57
temperature	16-19
wind, velocity of	42, 43

INDEX.

247

Grand Haven, meteorological conditions at, 1901.— <i>Continued.</i>	Page
meteorological observer at.....	2
Ground water (indexed water, ground).	
Haigh, Hon. Henry A. , member of State Board of Health, address, etc.....	viii
Hall, Jr., Asaph, meteorological observer, Ann Arbor.....	2
Halos, solar and lunar, dates of recording at five stations in 1901.....	30, 31
Harbor Springs village, Emmet county, typhoid fever in.....	146, 147
Harrisville, meteorological conditions at, 1901.....	3-57
atmospheric pressure.....	52-55
cloudiness.....	28, 29
humidity.....	22-25
latitude, longitude, altitude.....	3
ozone.....	34-37
rainfall.....	32, 33
temperature.....	3, 12, 13, 16-19
wind, direction, and number of observations of.....	46-51
meteorological observer at.....	2
Health and weather in Michigan in 1902 compared with previous years.....	xxx
bulletins of, in Michigan, purposes of.....	60, 61
in Michigan, condition of, first six months of 1902.....	xxvii-xxx
Health officials, conference of, subjects discussed.....	ix, x
Health officers, annual reports by.....	xx
instructions by telephone and telegraph.....	xxii, xxiii
instructions to newly appointed.....	xxii
list of names and addresses of, published.....	xxi
Humidity, absolute and relative.....	21-25, 92
Hydrophobia (rabies) in Michigan in 1901.....	237, 238
Immigrants , possibly exposed to communicable diseases, notices of arrival, etc....	xxiii, xxiv
possibly exposed to measles destined to settle in Michigan.....	198, 199
Influenza, as a comparative cause of sickness.....	86, 89, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 87, 96
relation of, to meteorological conditions.....	93, 94, 101
summaries of prevalence as regards time and area.....	74-85
Intermittent fever, as a comparative cause of sickness.....	86, 89, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 100, 104
relation of, to meteorological conditions.....	99, 102
summaries of prevalence as regards time and area.....	74-85
Isolation and disinfection in diphtheria, results of.....	133-135
in measles, results.....	195, 196, 199, 200
in scarlet fever, results.....	173-176
in smallpox, results.....	218-221
in typhoid fever, results.....	158-160
in whooping-cough, results.....	209-211
Itch in Michigan in 1901.....	232
Johnston, M. D., Collins H. , member of State Board of Health, address, etc.....	viii
Kedzie, Prof. R. C. , meteorological observer, Agricultural College.....	2
Kellogg, M. D., J. H., meteorological observer, Battle Creek.....	2
Kerosene casualties in Michigan in 1901.....	241, 242
Kidney, inflammation of, as a comparative cause of sickness.....	86, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 96, 97
relation of, to certain climatic conditions.....	93, 94, 101
summaries of prevalence of, as regards time and area.....	74-85
Lansing (indexed Board of Health, State).	
Latitude at meteorological stations in Michigan, Table II.....	3
Longitude at meteorological stations in Michigan, Table II.....	3
Lump jaw (actinomycosis) in Michigan in 1901.....	238, 239
MacLachlan, M. D., D. A. , member of State Board of Health, address, etc.....	viii
Map, distribution of consumption by counties in 1901.....	113
movement of contagium of smallpox in 1901.....	228
Marquette, meteorological conditions at, 1901.....	3-57
halos.....	30, 31
latitude, longitude, altitude.....	3
rainfall.....	22, 23
sunshine and clouds.....	57
temperature.....	16-19
wind, velocity of, etc.....	42, 43
meteorological observer at.....	2
meteorological phenomena at.....	8, 9
Measles.....	190-205
ages of prevalence, and mortality from.....	200-203
as a comparative cause of sickness.....	86, 89, 90, 91
average age.....	201, 202
by months in 1901.....	194, 197
by months, two lines of prevalence.....	204
case-mortality rates.....	202, 203
death-rates, 1868-1901, according to reports to Secretary of State.....	190, 191
distribution in counties, cities, villages and townships.....	192-194

	Page
Measles, duration of sickness.....	203, 204
immigrants possibly exposed, destined to settle in Michigan.....	198, 199
incubation period.....	200
infection, source and movement of.....	197, 198
in 1901 compared with previous years.....	190, 191
isolation and disinfection, results.....	195, 196, 199, 200
number of places at which present each week in 1901.....	106
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 98, 100
relation of, to meteorological conditions.....	99, 102
reports received, per cent received through newspapers.....	xxviii, 108, 109
sickness and death-rates, and fatality from.....	192, 193
summaries of prevalence of, as regards time and area.....	74-85
Meat poisoning and diseased meat in Michigan in 1901.....	239
Membranous croup (indexed croup, membranous).....	
Meningitis.....	180-189
ages of prevalence of, and mortality from.....	185, 186
as a comparative cause of sickness.....	86, 90
average age.....	186, 187
by months in 1901.....	185
cause of source of contagium.....	188, 189
deaths from, compared with deaths from other communicable diseases.....	180, 181
distribution by counties.....	182-184
duration of sickness.....	187, 188
importance of restricting.....	180, 181
in 1901 compared with previous years.....	184
number of localities infected, cases, deaths and fatality.....	181
number of places at which present each week in 1901.....	106
per cent of observers reporting presence of.....	71-73
reports received, per cent received through newspapers.....	xviii, 108, 109
per cent of reports, weekly card, stating presence of.....	63-65, 97, 104
relation of, to certain climatic conditions.....	93, 94, 101
routes by which it enters the body.....	189
sickness and death-rates.....	182-184
summaries of prevalence as regards time and area.....	74-85
Meteorology and sickness, first six months, 1902 compared with 1901.....	xxix, xxx
Meteorological characteristics of 1901 in Michigan.....	4-6
conditions and cold-weather diseases.....	93-98, 101
and warm-weather diseases.....	99, 100, 102
explanation of diagrams relating to.....	42, 44
in 1901 compared with previous years.....	5, 6, 92
relation of, to cold and warm weather diseases.....	93-102
representative data.....	7
Instruments.....	xxv
observations in Michigan, compiled, etc.....	1-57
observers, names and locations, Table I.....	2
phenomena.....	7-9
reports, work in regard to.....	xxi
stations in Michigan, location, observers, Table I.....	2
stations, latitude, longitude, altitude, average temperature and pressure, Table II.....	3
Mitchell, M. D., D. W., meteorological observer, Harrisville.....	2
Mumps (parotitis) in Michigan in 1901.....	233, 234
Neuralgia as a comparative cause of sickness.....	86, 89, 90, 91
per cent of observers stating presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 96, 98
relation of, to meteorological conditions.....	93, 94, 101
summaries of prevalence as regards time and area.....	74-85
Nuisances in Michigan in 1901.....	240
Observers making weekly reports of sickness, names and locations.....	66-69
meteorological, in Michigan, reports of, compiled.....	1-57
names and localities, Table I.....	2
Office of State Board of Health (Indexed Board of Health, State).....	
Olds, M. D., Wm. J., meteorological observer, Port Huron.....	2
Outbreak, definition of term as used in communicable disease articles.....	107, 133, 199
Ozone in Michigan in 1901.....	34-38, 92
Pague, B. S., meteorological observer, Detroit.....	2
Pamphlet publications of the State Board of Health.....	xxiii
Parotitis (mumps) in Michigan in 1901.....	233, 234
Patrick, Henry R., meteorological observer, Marquette.....	2
Pertussis (indexed whooping-cough).....	
Photo-engraved plates purchased by State Board of Health.....	xxiv, xxv
Physicians making weekly reports of sickness, names and locations.....	66-69
should have compensation for weekly reports of sickness.....	59
Pleuritis, as a comparative cause of sickness.....	86, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 97, 103
relation of, to certain climatic conditions.....	93, 94, 101
summaries of prevalence as regards time and area.....	74-85
Pneumonia, as a comparative cause of sickness.....	86, 89, 90, 91
in Michigan in 1901.....	126
per cent of observers reporting presence of.....	71-73

	Page
Pneumonia, per cent of reports, weekly card, stating presence of.....	63-65, 70, 96
relation of, to meteorological conditions.....	93, 94, 101
summaries of prevalence as regards time and area.....	74-85
Poisoning by meat.....	239
Port Huron, meteorological conditions at, 1901.....	3-57
halos.....	30, 31
latitude, longitude, altitude.....	3
rainfall.....	32, 33
sunshine and clouds.....	57
temperature.....	16-18
wind, velocity.....	42, 43
meteorological observers at.....	2
meteorological phenomena at.....	8, 9
Postal-card reports (indexed reports, postal-card, card).....	xiv-xviii
President of State Board of Health, annual address.....	86, 90, 81
Puerperal fever as a comparative cause of sickness.....	252
in Michigan in 1901.....	71-73
per cent of observers reporting presence of.....	63-65, 97, 98
per cent of reports, weekly card, stating presence of.....	93, 94, 101
relation of, to certain climatic conditions.....	74-85
summaries of prevalence as regards time and area.....	
Pulmonary consumption (indexed consumption, pulmonary).....	
Rabies (hydrophobia) in Michigan in 1901.....	237, 238
Rainfall, and sickness from typhoid fever.....	166
by months in 1901 and averages for 1878-87, and 1886-1900.....	165
in Michigan.....	81-83, 92
Ranney, M. D., Geo. E., State Inspector of Communicable Diseases, need for in-	
vestigations by.....	217
Remittent fever as a comparative cause of sickness.....	86, 90
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 100, 104
relation of, to meteorological conditions.....	99, 102
summaries of prevalence as regards time and area.....	74-85
Reports, annual, by health officers.....	xx
annual, of clerks, discontinued.....	xx
card, number received and average number of diseases on each.....	88
meteorological, in Michigan, compiled.....	1-57
meteorological, work in regard to.....	xxi
newspaper, of communicable diseases, received.....	xxviii, 108, 109
of communicable diseases, number received from all sources.....	108, 109
of work done in office of State Board of Health.....	xix-xxiv, xxvii, xxviii
postal-card, weekly, plan of, and compilation of.....	59-61
postal-card, statistical study of sickness based upon.....	58-104
quarterly, of the secretary.....	xxiv
required by law.....	vii, viii
secretary's, relative to property of State Board of Health.....	xxiv-xxvi
weekly, of sickness, Diagrams 1, 2, 3, 4, 5.....	70, 87, 98, 103, 104
weekly, of sickness, names and locations of physicians who made.....	66-69
weekly, of prevalence of each of 28 diseases as regards time and area.....	74-85
Reprints of State Board of Health publications.....	xxii
Rheumatism as a comparative cause of sickness.....	86, 89, 90, 81
per cent of observers stating presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 96, 98
relation of, to meteorological conditions.....	93, 94, 101
summaries of prevalence as regards time and area.....	74-85
Rütheln (German measles) in Michigan in 1901.....	180
Sanitary conventions.....	ix
information, ephemeral publications of.....	viii
Sault Ste. Marie, meteorological conditions at, 1901.....	3-57
latitude, longitude, altitude.....	3
rainfall.....	32, 33
sunshine and clouds.....	57
temperature.....	16-19
wind, velocity of.....	42, 43
meteorological observer at.....	2
meteorological phenomena at.....	8, 9
spread of smallpox from.....	226, 227
Scarlet fever.....	167-179
ages of prevalence of, and mortality from.....	174, 177, 178
as a comparative cause of sickness.....	86, 89, 90, 91
average age.....	174, 178
death-rates according to reports to the Secretary of State.....	168, 169
distribution of in counties, cities, villages and townships.....	169-171
duration of sickness.....	179
incubation period.....	174, 177
in each month of the year 1901.....	171-172
in 1901 compared with previous years.....	167-169
isolation and disinfection, results.....	173-176
number of localities at which present each week in 1901.....	106
number of localities infected each month.....	172
per cent of observers reporting presence of.....	71-73
per cent of reports received through newspapers, etc.....	xxviii, 108, 109
per cent of reports, weekly card, stating presence of.....	63-65, 87, 96

	Page
Scarlet fever, relation of, to meteorological conditions.....	93, 94, 101
sickness and death-rates, and fatality.....	168-170
source, vitality and movement of contagium.....	172, 173
summaries of prevalence as regards time and area.....	74-85
Sickness and climate.....	93-104
diagrams of weekly reports of.....	70, 87, 98, 103, 104
from average disease, 1901, compared with previous years.....	104
names and locations of physicians making weekly reports of.....	66-69
statistical study of, in Michigan.....	58-104
statistics, work in connection with.....	xxix
Smallpox (variola).....	215-228
ages of prevalence of, and mortality from.....	220, 221, 225
as a comparative cause of sickness.....	86, 89, 90, 91
average age.....	221, 225
cases, deaths, and death-rates in each year, 1892-1901.....	215
distribution by counties.....	216, 217
duration of sickness.....	221, 225
epidemic.....	215, 217
in Boyne Falls village, number of localities infected from.....	226
incubation period.....	220, 221
in each month of 1901.....	217, 218
in Sault Ste. Marie, localities infected from.....	226, 227
list of localities infected, with numbers of cases and deaths.....	222-225
number of places at which present each week in 1901.....	106
per cent of observers reporting presence of.....	71-73
per cent of reports received through newspapers, etc.....	xxviii, 108, 109
per cent of reports, weekly card, stating presence of.....	63-65, 87, 97
period of incubation.....	241
relation of, to certain climatic conditions.....	93, 94, 101
results of isolation and disinfection.....	218-221
source of movement of infection of.....	218, 225-227
summary of prevalence as regards time and area.....	74-85
Spinal meningitis (indexed meningitis).....	
State Board of Health (indexed Board of Health, State).....	
State buildings, plans examined by State Board of Health, for.....	x, xi
State Department, Division of Vital Statistics, deaths and death-rates reported to.....	111, 112, 115, 141, 168, 169, 191, 206
State Inspector of Communicable Diseases, benefits of investigations by.....	217
Sunny and cloudy days at certain stations in Michigan in 1901.....	57
Syphilis in Michigan in 1901.....	281
Table I. names of observers, meteorological, places of observation.....	2
II, latitude, longitude, altitude, average temperature and atmospheric pressure at stations in Michigan in 1901.....	3
III, average temperature, 1901 and 1877-1900, at stations in Michigan.....	3
IV, average temperature, 1901 and 1879-1900, at State Board of Health office.....	4
V, average temperature, 1901 and 1864-1900, at Agricultural College.....	4
VI, meteorological conditions by year and months at groups of stations.....	5, 6
VII, depth and temperature of water in wells at stations in Michigan.....	10
VIII, average temperature, 1901 compared with periods of years at stations.....	11
IX, average temperature and average line at stations in Michigan.....	12
X, average temperature, 1901 compared with previous years at Agricultural College.....	14
XI, average temperature in 1901 compared with previous years at Lansing..	14
XII, average temperature, comparative observations by different thermometers.....	15
XIII, average daily range of temperature in 1901 compared with previous years at stations in Michigan.....	15
XIV, extremes and range of temperature in 1901 at stations in Michigan..	16, 17
XV, average daily range, 1901, and average line, at stations in Michigan..	18
XVI, extremes and range of temperature, 1895-1901, 1901 compared with averages for 1877-1900, at groups of stations.....	20
XVII, average absolute humidity, 1901, compared with 1900 and 1877-1900.....	21
XVIII, average relative humidity for 1901, compared with 1900 and 1878-1900.....	21
XIX, absolute humidity in 1901 and average line.....	22
XX, relative humidity, 1901, and average line.....	24
XXI, foggy days in Michigan, by months, in 1901.....	26
XXII, number of observations of fog in each month of 1901.....	26
XXIII, average per cent of cloudiness by months and year, 1901.....	28
XXIV, cloudiness in 1901 compared with previous years.....	30
XXV, solar and lunar halos, dates when recorded in 1901.....	30, 31
XXVI, rainfall in 1901 compared with previous years.....	31
XXVII, rainfall by months in 1901 at stations in Michigan.....	32
XXVIII, ozone, day, by months, 1901, at stations in Michigan.....	34
XXIX, ozone, night, by months, 1901, at stations in Michigan.....	36
XXX, ozone, day, in 1901, compared with previous years.....	38
XXXI, ozone, night, in 1901, compared with previous years.....	38
XXXII, velocity of wind in 1901 compared with previous years.....	39
XXXIII, velocity of wind at Lansing in 1901 compared with previous years.....	39
XXXIV, velocity of wind by hours and months at Lansing.....	40
XXXV, average velocity, by months in 1901 at stations in Michigan.....	42
XXXVI, direction of wind by months, 1891-1900.....	44
XXXVII, direction of wind, average number of observations, 1901.....	45
XXXVIII, direction of wind, number of observations in 1901 at 7 stations..	46

INDEX.

251

Table XXXIX, direction of wind, number of observations at 7 stations, and average line for 7 stations, by months, 1901.....

Page

XL, atmospheric pressure, average daily range, at certain stations.....	47-50
XLI, atmospheric pressure, average daily range in 1901, and normal range..	52
XLII, average atmospheric pressure in 1901 compared with previous years	53
XLIII, average atmospheric pressure at certain stations by months in 1901..	53
XLIV, atmospheric pressure, average daily range in 1901 compared with previous years.....	54
XLV, atmospheric pressure, range by months, 1901, compared with previous years	56
XLVI, sunny and cloudy days at certain stations in 1901.....	56
1, consumption, localities, cases, deaths, fatality, 1893-1901.....	57
2, consumption, death-rate for each year, 1869-1901.....	110
3, consumption, distribution of, and sickness and death-rates, by counties....	111
4, consumption, and pulmonary consumption, deaths from each, by months in 1901 and averages for 1894-1900.....	114
5, consumption, in age-groups, cases, deaths and fatality.....	115
6, consumption, by sex, in age-groups, number and per cent of deaths.....	116
7, consumption, duration of sickness of fatal cases.....	117
8, consumption, duration of sickness of non-fatal cases.....	118
1, diphtheria, comparison of cases and deaths in outbreaks in which anti-toxin was used with those in outbreaks in which it was not used.....	127
2, diphtheria, comparison of sickness and deaths, for 1884-93, before the use of antitoxin, with sickness and deaths for 1894-1901, since its use....	129
3, diphtheria, distribution of, and sickness and death-rates, by counties....	130
4, diphtheria, in cities, villages and townships.....	131
5, diphtheria, by months, outbreaks which began, ended, and were present..	131
6, diphtheria, by months, sickness from, and number of localities infected..	131
7, diphtheria, cases and deaths prevented by isolation and disinfection....	134
8, diphtheria, cases and deaths per restricted and neglected outbreaks.....	135
9, diphtheria, incubation period.....	136
10, diphtheria, in age-groups, cases, deaths and fatality.....	136
11, diphtheria, by sex, in age-groups, per cent of cases and deaths.....	137
12, diphtheria, by sex, in age-groups, per cent of non-fatal cases.....	137
13, diphtheria, by sex, in age-groups, per cent of fatal cases.....	138
14, diphtheria, duration of sickness of fatal cases.....	138
15, diphtheria, duration of sickness of non-fatal cases.....	139
1, gasoline casualties.....	242
1, kerosene casualties in Detroit.....	241, 242
1, measles, in 1901 compared with previous years.....	191
2, measles, death-rate for each year, 1868-1901.....	191
3, measles, distribution of and sickness and death-rates, by counties.....	193
4, measles, in cities, villages, and townships.....	194
5, measles, by months, outbreaks which began, ended and were present.....	194
6, measles, by months, sickness from, and number of localities infected....	194
7, measles, cases and deaths per restricted and neglected outbreaks.....	195
8, measles, cases prevented and lives saved by isolation and disinfection....	196
9, measles, incubation period.....	200
10, measles, in age-groups, cases, deaths and fatality.....	201
11, measles, in age-groups, per cent of cases and deaths.....	201
12, measles, by sex, in age-groups, per cent of non-fatal cases.....	202
13, measles, by sex, in age-groups, per cent of fatal cases.....	202
14, measles in age-groups, case-mortality rates.....	203
15, measles, duration of sickness of fatal cases.....	203
16, measles, duration of sickness of non-fatal cases.....	203
17, measles, by months, two lines of evidence of prevalence.....	204
1, meningitis, localities infected, cases, deaths, and fatality.....	181
2, meningitis, distribution by counties.....	182, 183
3, meningitis, in 1901 compared with previous years.....	184
4, meningitis, by months in 1901.....	185
5, meningitis, by sex, in age-groups, number and per cent of deaths.....	185
6, meningitis, by sex, in age-groups, number and per cent of non-fatal cases	186
7, meningitis, duration of sickness of fatal cases.....	187
8, meningitis, duration of sickness of non-fatal cases.....	187
9, meningitis, source of contagium.....	188
1, number of outbreaks of communicable diseases, per cent reported through newspapers, per cent confirmed by health officers, first six months of 1902	xviii
2, number of outbreaks of communicable diseases, per cent reported through newspapers, per cent confirmed by health officers, 1901.....	108
1, number of places at which communicable diseases were present in 1901..	106
1, scarlet fever in 1901 compared with previous years.....	167
2, scarlet fever, death-rate for each year, 1868-1901.....	168
3, scarlet fever, distribution of, and sickness and death-rates, by counties..	170
4, scarlet fever, in cities, villages and townships.....	171
5, scarlet fever, by months, outbreaks which began, ended and were present..	171
6, scarlet fever, by months, sickness from, and number of localities infected..	172
7, scarlet fever, cases and deaths per restricted and neglected outbreaks....	175
8, scarlet fever, cases and deaths prevented by isolation and disinfection....	175
9, scarlet fever, incubation period.....	177
10, scarlet fever, in age-groups, cases, deaths and fatality.....	177
11, scarlet fever, by sex, in age-groups, per cent of cases and deaths.....	178
12, scarlet fever, by sex, in age-groups, per cent of deaths.....	178
13, scarlet fever, by sex, in age-groups, per cent of non-fatal cases.....	178
14, scarlet fever, duration of sickness of fatal cases.....	179
15, scarlet fever, duration of sickness of non-fatal cases.....	179

	Page
Table 1. smallpox, cases deaths, and death-rates, in each year, 1892-1901.....	215
2. smallpox, distribution of and sickness and death-rates by counties.....	216
3. smallpox, by months, outbreaks which began, ended and were present....	217
4. smallpox by months, sickness from, and number of localities infected.....	217
5. smallpox, source of contagium.....	218
6. smallpox, cases and deaths per restricted and neglected outbreaks.....	219
7. smallpox, incubation period.....	220
8. smallpox, in age-groups, cases, deaths and fatality.....	220
9. smallpox, by sex, in age-groups, number and per cent of non-fatal cases..	221
10. smallpox, by sex, in age-groups, duration of sickness of non-fatal cases..	221
11. smallpox, list of localities infected with numbers of cases and deaths.....	222-225
12. smallpox, movement of infection (extract from table).....	226, 227
1. typhoid fever, in 1901 compared with previous years.....	141
2. typhoid fever, distribution of, and sickness and death-rates, by counties..	142
3. typhoid fever, by months, outbreaks which began, ended and were present	143
4. typhoid fever, by months, cases taken sick and present.....	143
5. typhoid fever, movement of contagium.....	148-157
6. typhoid fever, cases and deaths per restricted and neglected outbreaks....	158
7. typhoid fever, cases and deaths prevented by isolation and disinfection....	159
8. typhoid fever, duration of sickness of fatal cases.....	161
9. typhoid fever, duration of sickness of non-fatal cases.....	161
10. typhoid fever, by sex, in age-groups, per cent of sickness.....	162
11. typhoid fever, by sex, in age-groups, per cent of deaths.....	162
12. typhoid fever, by sex, in age-groups, deaths and death-rates.....	163
13. typhoid fever, by weekly postal reports, per cent reported.....	164
14. height of ground water at Lansing.....	164
15. typhoid fever, sickness from, and height of ground water at Lansing.....	159
16. typhoid fever, by weekly card reports, prevalence of.....	165
17. rainfall by months in 1901, and averages 1878-87 and 1886-1900.....	165
18. temperature of water in well at Lansing.....	165
19. typhoid fever, sickness from, and depth and temperature of water in well at Lansing.....	166
20. rainfall, depth of ground water, and sickness from typhoid fever.....	166
1. whooping-cough in 1901 compared with previous years.....	206
2. whooping-cough, distribution of, and sickness and death-rates, by counties	208
3. whooping-cough, outbreaks present in each month of 1901.....	209
4. whooping-cough, source of contagium.....	209
5. whooping-cough, cases and deaths per restricted and neglected outbreaks..	211
6. whooping-cough, incubation period.....	212
7. whooping-cough, in age-groups, cases, deaths and fatality.....	212
8. whooping-cough, by sex, in age-groups, per cent of non-fatal cases.....	213
9. whooping-cough, by sex, in age-groups, per cent of fatal cases.....	213
10. whooping-cough, by sex, in age-groups, duration of sickness of fatal cases	214
11. whooping-cough, by sex, in age-groups, duration of sickness of non-fatal cases	214
1. per cent of weekly card reports stating presence of each of 28 diseases in each year, 1890-1901, and averages for 1890-1900.....	63-65
2. names and localities of observers making weekly reports of sickness.....	66-69
4. per cent of observers reporting presence of each of 28 diseases in 1891-1901, and averages for 1891-1900.....	71-73
5. summary of prevalence of the 28 diseases, as regards time and area.....	74-83
6. summary of prevalence of diseases, by geographical divisions of State....	84, 85
7. order of prevalence of 28 diseases in each of the years, 1891-1901.....	86
8. stating for each of years 1891-1901, the number of card reports received, and average number of diseases on each report.....	88
9. diseases in order of apparent amount of sickness, in each year, 1897-1901..	89
10. diseases in order of apparent amount of sickness by geographical divisions of State	90, 91
11. comparison of meteorological conditions in 1901 with preceding years....	92
12. bronchitis and meteorological conditions.....	95
13. per cent of weekly card reports stating presence of cold-weather diseases by months in 1901 compared with 1891-1900.....	96, 97
14. per cent of weekly card reports stating presence of warm-weather diseases by months in 1901 compared with 1891-1900.....	100
15. summary of prevalence of cold weather diseases, and climatic conditions..	101
16. summary of prevalence of warm weather diseases, and climatic conditions	102
17. sickness from average disease.....	104
Teachers' Sanitary Bulletins (indexed bulletins, teachers' sanitary).....	
Tecumseh, meteorological conditions at, 1901.....	3-57
atmospheric pressure	52-55
cloudiness	28, 29
humidity	22, 25
latitude, longitude, altitude.....	3
ozone	34, 37
rainfall	32, 33
temperature	12, 13, 16-19
wind, direction, and number of observations of	46-51
meteorological observer, at 1901.....	2
Tefft, C. C., meteorological observer, Tecumseh.....	2
Telegraph, instructions to health officers by.....	xxii, xxiii
Telephone, instructions to health officers by.....	xxii, xxiii
Temperature, average, at meteorological stations in Michigan, Table II.....	3
by months in 1901 compared with previous years.....	11, 15, 92
by year and months, at Agricultural College, Table V.....	4
by year and months, at office of State Board of Health.....	4

INDEX.

253

	Page
Temperature, average, by year and months, at certain stations, Table IX.....	12
by year and months at groups of stations, Table III.....	3
comparative observations by different thermometers.....	15
daily range and average line at certain stations.....	18, 19
daily range in 1901 compared with previous years.....	15, 92
extremes and range.....	16, 17, 20
of water in well at Lansing.....	165, 166
representative data in regard to.....	7
Tetanus in Michigan in 1901.....	234, 235
Thornville, meteorological conditions at, 1901.....	3-57
atmospheric pressure.....	52-55
cloudiness.....	28, 29, 57
halos.....	30, 31
humidity.....	22-25
latitude, longitude, altitude.....	8
ozone.....	34-37
rainfall.....	32, 33
sunshine and clouds.....	57
temperature.....	3, 12, 13, 16-19
wind, direction, and number of observations of.....	46-51
meteorological observer at.....	2
meteorological phenomena at.....	7-9
Tonsillitis, as a comparative cause of sickness.....	86, 89, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 87, 96
relation of, to meteorological conditions.....	93, 94, 101
summaries of prevalence as regards time and area.....	74-85
Total sickness and average disease.....	102-104
Traumatic meningitis (indexed meningitis).	
Traverse City, meteorological conditions at, 1901.....	3-57
atmospheric pressure.....	52-55
cloudiness.....	28, 29, 57
humidity.....	22-25
latitude, longitude, altitude.....	8
ozone.....	34-37
rainfall.....	32, 33
sunshine and clouds.....	57
temperature.....	3, 12, 13, 16-19
water in well, depth, temperature, etc.....	10
wind, direction of, and number of observations of.....	46-51
meteorological observer at.....	2
meteorological phenomena at.....	8, 9
Tubercular meningitis (indexed meningitis).	
Tuberculosis (indexed also consumption).	
in animals in Michigan in 1901.....	285
Typhoid fever.....	139-166
ages of prevalence of, and mortality from.....	162, 163
as a comparative cause of sickness.....	86, 89, 90, 91
attributed to contaminated water.....	147
average age, Tables 10 and 11.....	162
comparison of deaths reported to the office of the State Board of Health with those reported to the Secretary of State.....	141
distribution of, by counties in 1901.....	141, 142
duration of sickness from.....	161, 162
in each month in 1901.....	143
in 1901 compared with previous years.....	140, 141
in Harbor Springs village, Emmet county.....	146, 147
in We-que-ton-sing, Little Traverse Tp.....	143-146
isolation and disinfection, results of.....	158-160
number of localities at which present each week in 1901.....	106
per cent of observers reporting presence of.....	71-73
per cent of reports received through newspapers.....	xxviii, 108, 109
per cent of reports, weekly card, stating presence of.....	63-65, 100, 104
prevalence of, by weekly card-reports.....	165
relation of, to meteorological conditions.....	99, 102
sickness and death-rates from, reported.....	141, 142
sickness from, depth and temperature of water in well at Lansing....	159, 166
source and movement of contagium.....	143-157, 160
summary of prevalence, as regards time and area.....	74-85
two lines of evidence of prevalence.....	163, 164
Typho-malarial fever, as a comparative cause of sickness.....	86, 90, 91
per cent of observers reporting presence of.....	71-73
per cent of reports, weekly card, stating presence of.....	63-65, 100, 104
relation of, to meteorological conditions.....	99, 102
summaries of prevalence as regards time and area.....	74-85
Varicella in Michigan in 1901.....	229
Variola (indexed smallpox).	
Vaughan, M. D., Victor C., member of the State Board of Health, address, etc.....	viii
Wait, S. E., meteorological observer, Traverse City.....	2
Warm-weather diseases, relation of, to meteorological conditions.....	99, 100, 102
Water, depth and temperature of, in well at Lansing, and sickness from typhoid fever.....	159, 164, 166
Weather and health in Michigan in 1902 compared with previous years.....	xxx

